

JOURNAL

OF THE

ARNOLD ARBORETUM

VOL. XXIII

OCTOBER, 1942

NUMBER 4

PLANTAE PAPUANAE ARCHBOLDIANAE, X*

E. D. MERRILL AND L. M. PERRY

LIKE earlier papers of the series, this contains descriptions of novelties and records of range-extensions or sometimes of older names which have not yet found their way into current use in this flora. The miscellany includes families from the Balanophoraceae to the Ceratophyllaceae, the Connaraceae, Leguminosae, Datisceae, Haloragaceae, Loganiaceae, and a note on *Mastixiodendron* Melchior. Several people at different times have contributed to the determinations for the Leguminosae of the various Archbold Expeditions. While naming the 1938-39 collection, we have re-checked the others for the range-extensions which are here recorded, appending to each, where known, the name of the person who made the determination. Although not wholly in favor of designating *subspecies* in preference to *varieties*, we have followed the nomenclature of Danser in the Polygonaceae and of Mattfeld in the Caryophyllaceae to avoid nomenclatural changes in groups with which we are not at all familiar.

BALANOPHORACEAE

Balanophora J. R. & G. Forster

Balanophora papuana Schlechter, Bot. Jahrb. **50**: 68, f. 1, A-E. 1913; Harms, Nat. Pflanzenfam. ed. 2, **16b**: 334, f. 168. 1935.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, Brass 12232, January 1939, alt. 700 m., frequent in open places between Pandanus prop-roots, etc., in rain-forest ravine (orange-brown warty masses \pm 20 cm. diameter, 15 cm. high).

Previously known from Northeastern New Guinea.

ARISTOLOCHIACEAE

Aristolochia Linnaeus

Aristolochia gracilifolia O. C. Schmidt, Bot. Jahrb. **58**: 490. 1923.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, Brass 12909, February 1939, alt. 1200 m., climbing to 3 m. in oak forest undergrowth

*Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **23**: 233-297. 1942.

(flowers greenish white, tinged and veined with purple). BRITISH NEW GUINEA: Mafulu, *Brass* 5229, September–November 1933, alt. 1250 m., climbing in undergrowth of limestone regions, uncommon (flowers closely purple-reticulate over a yellowish ground color).

These collections suit the original description of this species fairly well. In *Brass* 5229 the leaves are 7–8 cm. long, 2.2–3 cm. broad, while those of *Brass* 12909 are 22 cm. long, 5 cm. broad. The inflorescences are 7 cm. and 17 cm. long respectively, the shorter being axillary, the longer apparently lateral. In spite of the difference in the size of the leaves and the position of the inflorescence, the similarity of the flower-buds as well as the leaf-shape and venation is good evidence that the two are conspecific.

The type of *Aristolochia pithecurus* Ridl. ought to be examined. The description of the flower is very much like that of this species. It is to be noted, however, that the flowers are described as sessile and the bracts as 1 cm. long. Further, Lauterbach described an isotype (Bot. Jahrb. **52**: 106. 1914), *Forbes* 621 deposited in the Leiden Herbarium, as representing flowering material of *A. momandul* K. Schum. Evidently the collection was a mixture.

Aristolochia tagala Cham. Linnaea **7**: 207, t. 5. f. 3. 1832; Merr. Enum. Philip. Fl. Pl. **2**: 120. 1923.

Aristolochia megalophylla K. Schum. in K. Schum. & Holtr. Fl. Kaiser Wilhelms Land 104. 1889; Warb. Bot. Jahrb. **13**: 300. 1891; K. Schum. Notizbl. Bot. Gart. Berl. **2**: 113. 1898; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 302. 1900; Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien **89**: 549. 1913; Lauterb. Bot. Jahrb. **52**: 106. 1914.

BRITISH NEW GUINEA: Daru Island, *Brass* 6382A; Mabaduan, *Brass* 6504, climbing in second growth rain-forest; Lake Daviumbu, Middle Fly River, *Brass* 7718, large climber common in second growth rain-forest. SOLOMON ISLANDS: Bougainville: Karngu, Buin, *Kajewski* 2225, vine climbing rain-forest trees.

Although in most instances the leaves of the New Guinean specimens are larger than those of the Philippine material, we have been unable to find any real specific differences.

POLYGONACEAE

Rumex Linnaeus

Rumex Brownii Campdera, Mon. Rumex, 64, 81. 1819; Danser, Bull. Jard. Bot. Buitenz. III. **8**: 131. 1927; l. c. **13**: 429. 1935.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11387, November 1938, alt. 2200 m., very abundant weed in native gardens and about villages.

Reported previously from a collection in the mountains of British New Guinea. The field note indicates that the plant is aggressive.

Polygonum Linnaeus

Polygonum benguetense Merr. Philip. Jour. Sci. **10**: 301. 1915; Enum. Philip. Fl. Pl. **2**: 122. 1923.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9036, 9437, August 1938, alt. 3225 m., with mosses and small sedges on shores of lake, common (prostrate and ascending; flowers white).

These collections are a reasonably good match for the Philippine material. The species has been considered as a variety of *Polygonum strigosum* R. Br. by Steward, but until further material is available to show intermediate variations we prefer to maintain it as a species.

Polygonum minus* subsp. *decipiens Danser, Bull. Jard. Bot. Buitenz. III. 8: 178. 1927; l. c. 13: 429. 1935.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9436, 9512, August 1938, alt. 3225 m., ascending to 1 m. among tall sedges of the lake shore and covering muddy places on drying margins of the lake (flowers pink).

Reported by Danser from Papua on a collection of an earlier Archbold Expedition.

Polygonum minus* subsp. *depressum Danser, Bull. Jard. Bot. Buitenz. III. 8: 176, f. 9. 1927.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9544, August 1938, alt. 3225 m., frequent with *Eriocaulon*, *Ranunculus*, etc. on open boggy ground (prostrate and spreading to 20 cm. diameter; flowers pink).

Although the leaves are smaller, 1–1.5 cm. long, than usual in this plant, and the spikes are shorter, it is too much like Danser's figure and a collection from Java to place it elsewhere. Danser gives the range as India, Sumatra, and Java.

Polygonum lapathifolium Linn. Sp. Pl. 360. 1753; Danser, Bull. Jard. Bot. Buitenz. III. 8: 185. 1927.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11623, December 1938, alt. 1600 m., common in old ditches (about 1 m. high; flowers pink).

As far as we know the species has not previously been recorded from New Guinea, although it is known from Malaysia and Australia.

Polygonum runcinatum* subsp. *papuanum Danser, Bull. Jard. Bot. Buitenz. III. 13: 430. 1935.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9123, August 1938, alt. 3225 m., plentiful in shrubberies bordering forest, scrambling and sometimes densely massed; southern slopes of Grand Valley, *Brass* 9260 (coll. *Capt. Teerink*), August 1938, alt. 1800–2000 m.; 9 km. northeast of Lake Habbema, *Brass* 10759, October 1938, alt. 2800 m., scrambling to 2–3 m. in young second growths on native clearings (flowers green); Bele River, 18 km. northeast of Lake Habbema, *Brass* 11504, November 1938, alt. 2200 m., scrambling in grassy second growth, common.

This species was previously reported by Danser from Mount Tafa, Papua. On account of the extension of range, we have recorded these collections and note the fact that the field-notes indicate it is fairly common in the region.

AMARANTHACEAE

Deeringia R. Brown

Deeringia amaranthoides (Lam.) Merr. Interpret. Rumph. Herb. Amb. 211. 1917; Rehder, Jour. Arnold Arb. 14: 66. 1933.

Achyranthes amaranthoides Lam. Encycl. 1: 548. 1785.

Deeringia baccata (Retz.) Moq. in DC. Prodr. 13²: 236. 1849; K. Schum. & Holtr. Fl. Kaiser Wilhelms Land 42. 1889; Warb. Bot. Jahrb. 13: 303. 1891; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 303. 1900.

Deeringia celosioides R. Br. Prodr. 413. 1810; F. v. Muell. Pap. Pl. 1: 41. 1876; F. M. Bail. Queensl. Agric. Jour. 23: 220. 1909.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2164, August 1930, alt. 900 m., rain-forest.

Apparently this is the first record of this fairly wide-ranging species from the Solomon Islands.

AIZOACEAE

Glinus Linnaeus

Glinus oppositifolius (L.) Aug. DC. Bull. Herb. Boiss. II. **1**: 559. 1901; Pax & Hoffman, Nat. Pflanzenfam. ed. 2, **16c**: 222, f. 95 A-D. 1934.

Mollugo oppositifolia Linn. Sp. Pl. 89. 1753.

Glinus Spergula (L.) Fenzl in Spreng. Nom. Bot. ed. 2, **1**: 688. 1840; Pax, Nat. Pflanzenfam. **3**(1b): 40. 1889; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 308. 1900; Pulle, Nov. Guin. **8**: 355. 1910.

BRITISH NEW GUINEA: Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8446, December 1936, abundant on shaded banks of waterhole.

This species has been recorded from New Guinea previously as *Mollugo* and as *Glinus Spergula* (L.) Pax.

Mollugo Linnaeus

Mollugo pentaphylla Linn. Sp. Pl. 89. 1753; Merr. Enum. Philip. Fl. Pl. **2**: 135. 1923.

Mollugo stricta Linn. Sp. Pl. ed. 2, 131. 1762; F. v. Muell. Pap. Pl. **2**: 43. 1886; Warb. Bot. Jahrb. **13**: 305. 1891; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 308. 1900; Rechingen, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien **89**: 551. 1913.

BRITISH NEW GUINEA: Daru Island, *Brass* 6386, a wet season ephemeral, gregarious on hard compacted soil; Baroka, Nakeo District, *Brass* 3735, damp soil on savanna flat, rare.

PORTULACACEAE

Montia Michaux

Montia lamprosperma Cham. Linnaea **6**: 565. 1831; Fernald & Wiegand, Rhodora **12**: 138, t. 84c. 1910; von Poellnitz, Rep. Sp. Nov. **30**: 317. 1932; Pax & Hoffm. Nat. Pflanzenfam. ed. 2, **16c**: 259. 1934.

NETHERLANDS NEW GUINEA: 4 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 9972, September 1938, alt. 3650 m., prostrate on banks of a grassland stream.

The genus is new to Papuaasia. The species is one of several which form the aggregate species *Montia fontana* L. reported from southern Australia and New Zealand as well as being wide-spread in north temperate regions. *Montia fontana* L. sensu strictu has much duller and minutely tuberculate seeds.

Portulaca Linnaeus

Portulaca quadrifida Linn. Mant. **1**: 73. 1767; Merr. Enum. Philip. Fl. Pl. **2**: 136. 1923; von Poellnitz, Rep. Spec. Nov. **37**: 275. 1934.

SOLOMON ISLANDS: Ula wa: *Brass* 2991, October 1932, common on beach sands (whole plant very fleshy; flowers yellow). A widespread tropical weed apparently not previously recorded from the Solomon Islands.

CARYOPHYLLACEAE

Stellaria Linnaeus

Stellaria saxatilis Buch.-Ham. in Don, Prodr. Fl. Nep. 215. 1825; Edgeworth & Hook. f. Fl. Brit. Ind. **1**: 232. 1874; Handel-Mazzetti, Symb. Sin. **7**: 190. 1929.

Stellaria laxa Merr. Philip. Gov. Lab. Bur. Bull. **29**: 12. 1905, Enum. Philip. Fl. Pl. **2**: 138. 1923, non F. Behm. (1887).

Stellaria stellato-pilosa Hayata, Jour. Coll. Sci. Tokyo 25, Art. **19**: 58, t. 2. 1908.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass* 10728, October 1938, alt. 2800 m., scrambling over shrubs and ferns in native clearings in the forest (flowers white); Bele River, 18 km. northeast of Lake Habbema, *Brass* 11582, November 1938, alt. 2200 m., very abundant about native villages, scrambling over garden fences, etc. (flowers white).

As far as we know the genus is new for New Guinea. The collections are a good match for *Stellaria laxa* Merr. from the Philippines and the plate of *S. stellato-pilosa* Hay. and as far as we can judge from the somewhat meager material from India, it is not specifically distinct from *S. saxatilis* Buch.-Ham. We also have a few collections from Yunnan which appear to belong to this species. If we are correct in our identification of this material this is an extension of the range of this Himalayan species known to occur in the high mountains of Yunnan, Formosa, Luzon, possibly in Java, and now in New Guinea. We have not seen any material from Java and hence, we are not sure of the identity.

Cerastium Linnaeus

Cerastium Keysseri Schlechter in Diels, Bot. Jahrb. **62**: 478. 1929; Mattf. Bot. Jahrb. **69**: 270. 1938.

NETHERLANDS NEW GUINEA: northern slopes of Mount Wilhelmina, *Brass & Myer-Drees* 10089, September 1938, alt. 4150 m., under a rock on alpine grassland.

This is a very compact little plant with small flowers agreeing fairly well with the description of the type. It does not differ essentially from some Clemens' collections cited by Mattfeld except that it is much more compact and hence appears more pubescent, the narrowed base of the leaves and the internodes are much shorter than in the plant of looser habit, but we have not found any apparent specific differences. Previously known only from Northeastern New Guinea.

Cerastium papuanum subsp. **geminiflorum** Mattf. Bot. Jahrb. **69**: 269. 1938.

NETHERLANDS NEW GUINEA: Northern slopes of Mount Wilhelmina, *Brass* 10081, September 1938, alt. 3950 m., alpine grassland, in thick soft mats on moist rocks.

This collection is a good match for the isotype, *Brass* 4309, from Mount Albert Edward.

Cerastium papuanum subsp. **phaenops** var. **eciliatum** Mattf. Bot. Jahrb. **69**: 269. 1938.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9122, August 1938, alt. 3225 m., scrambling on grass tussocks about forest margins (flowers white); 11 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 9720, September 1938, alt. 3400 m., rather dry western slope, grassy place (flowers white).

Here again these two collections appear to be conspecific with the isotype of this variety collected on Mount Albert Edward.

Sagina Linnaeus

Sagina belonophylla Mattfeld, Bot. Jahrb. **70**: 468. 1940.

NETHERLANDS NEW GUINEA: 7 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 10021, September 1938, alt. 3650 m., alpine grassland, cushioned on moist rocks

(flowers white); northern slopes of Mount Wilhelmina, *Brass & Myer-Drees 10086*, September 1938, alt. 3950 m., common on old grassy scree, in cushions 12–15 cm. diameter. *Sagina belonophylla* Mattf. was described from a collection made on Mount Sarawaket in 1937.

Sagina papuana Warb. Bot. Jahrb. **16**: 14, 21. 1892; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 310. 1900; van Steenis, Bull. Jard. Bot. Buitenz. **13**: 181. 1934; Mattf. Bot. Jahrb. **69**: 270. 1938.

NETHERLANDS NEW GUINEA: 11 km. northeast of Wilhelminatop, *Brass & Myer-Drees 9744*, September 1938, alt. 3400 m., wet grassy valley; northern slopes of Mount Wilhelmina, *Brass & Myer-Drees 10041*, September 1938, alt. 4050 m., forming loose cushions in long grass of old rock scree; 9 km. northeast of Lake Habbema, *Brass 10552*, October 1938, alt. 2800 m., prostrate and matted in open beds of streams (flowers white).

This species has been recorded from Northeastern New Guinea, Papua and the Philippines. Mattfeld has already pointed out that it shows considerable variation. Although we have eight collections at hand, these still are not sufficient for us to define the specific limits. In addition we have two other collections: Lake Habbema, *Brass 9202, 9438A*, August 1938, alt. 3225 m., matted on open boggy ground and gregarious on open low shores of lake (flowers white). These plants do not have the long decumbent twining stems characteristic of the other collections but are fairly short as if they grew in tussocks. The calyx is shorter, as in the original description, and the petals are lacking. The leaves are not so definitely cuspidate, and the capsule is longer than the calyx, but owing to the variation within the species we are inclined to believe the differences here are environmental rather than inherent.

Sagina echinosperma Hayata, Icon. Pl. Formos. **3**: 39. 1913; Masamune, Short Fl. Formos. 61. 1936.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11569*, November 1938, alt. 2350 m., rooting in earthy niches on a sparsely vegetated limestone precipice (flowers white).

Although the collection and the original description show some little differences, in view of the variation in our material of *Sagina papuana* Warb., it is perhaps better at present to place the collection with the Formosan species. Hayata's description does not mention the minute pustulations on the leaves, nor the \pm remote hairs on the lower surface of the midrib. The petals (4 mm.) in the New Guinea material are longer than the sepals and the fully mature seeds are 0.6–0.8 mm. long. There are 10 stamens, those opposite the sepals have a glandular base as in *S. papuana* Warb. Although this appears to be a rather disrupted range, it is to be noted that *Stellaria saxatilis* Buch.-Ham., with a much wider range, has been found in the same localities. This is evidently a montane plant.

NYMPHAEEACEAE

Nymphaea Linnaeus

It has been somewhat difficult to name the collection of *Nymphaea* L., not only on account of the lack of material for comparison, but also owing to the varying interpretations writers have given the species of this genus.

Further, most workers have had the advantage of handling living plants. In the New Guinean collections there are apparently five distinct species, three of which belong to the "gigantea-group." In that group five species have been described, all Australian except *N. gigantea* Hook., which has been reported from New Guinea. There has been considerable variance of opinion in interpreting *N. violacea* Lehm. Whatever the species may really be, we seem to have at present no alternative to placing three Papuan collections in it. With the exception of *Brass* 5842, which we have named *N. pubescens* Willd., the flowers of the material of *N. violacea* Lehm. are the largest in the collections under consideration.

Nymphaea violacea Lehmann Hamb. Garten- und Blumenzeit. 9: 218. 1853; Henkel, Rehnelt & Dittman, Das Buch Nymphae. 65. 1907.

Nymphaea Brownii F. M. Bail. Queensl. Fl. 1: 39. 1899.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7607, few plants in water of swamps (underside of leaves violet-colored; flowers pale blue); same locality, *Brass* 7610, commonest species in the great lagoons and swamps (lateral nerves of leaves scarcely visible on the upper surface; underside of leaves violet-colored; flowers white, peduncles striped with purple); Dagwa, Oriomo River, *Brass* 5949, few plants in small pond on savanna, uncommon (leaves floating flatly on water, pale and smooth above and dark purple beneath except the green midrib and veins; petioles marked with very fine purple lines; flowers raised 15–20 cm. above surface of water on peduncles heavily lined with dark purple; sepals outside very dark with streaked markings of deep purple and yellow-green, inside bluish white; petals blue with a purple tinge towards the apex; stamens pale yellow; fertilized flowers retracted to bottom of pond by snake-like coiling of peduncles).

We have not attempted to assemble the synonymy of this species. The material agrees well with Bailey's description of *Nymphaea Brownii* and also seems to be in accord with *N. violacea* Lehm. The flowers are larger than in either of the species we have described, the seeds are smaller than in *N. macrosperma* and very minutely reticulate.

Nymphaea macrosperma sp. nov.

Folia in sicco coriacea glabra cordato-suborbicularia \pm 17 cm. longa 14 cm. lata margine 1.5–2 cm. remote repando-dentata, dentibus brevissimis interdum mucronatis, supra minutissime elevato-punctata, subtus costa valida nervis primariis utrinque \pm 6 palmatim dispositis elevatis reticulatim conjunctis marginem versus subevanidis; floribus 6–7 cm. diametro; sepalis 4 oblongis 3 cm. longis 1.2 cm. latis apice obtusis; petalis \pm 14 oblanceolato-oblongis 3 cm. longis apice obtusis; staminibus numerosis, antheris oblongis 3 mm. longis apice apiculatis vel obtusis, filamentis filiformibus; radiis stigmaticis 10 oblongo-cuneatis apice obtusis; seminibus \pm 4 mm. longis 3 mm. diametro, oblongis vel leviter ovoideis, more affinitatis lineis pubescentibus ornatis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7608 (TYPE), August 1936, plentiful in open water of swamps and lagoon and rooting in water up to 2 fathoms deep (underside of leaves violet-colored, nerves clearly visible on the upper surface; flowers blue); Lake Daviumbu, *Brass* 7606, pink form of the common blue water-lily, one plant seen.

This species has smaller flowers and leaves than *Nymphaea Casparyi* Rehnelt & Henkel but is unquestionably of that alliance. The ovary is

naked between the ring of stamens surrounding the stigmatic rays and the insertion of the petals at the base.

***Nymphaea dictyophlebia* sp. nov.**

Folia in sicco coriacea glabra cordato-suborbicularia 37–45 cm. longa 34–37 cm. lata margine 2–3 cm. remote dentata, dentibus 3–4 mm. longis sublinearibus, supra minutissime elevato-punctata, subtus costa valida nervis primariis utrinque \pm 11 palmatim dispositis prominentibus reticulatim conjunctis; floribus 7–8 cm. diametro; sepalis 4 obovatis 3 cm. longis vix 2 cm. latis apice obtusis; petalis \pm 24 obovato-oblongis basi angustatis 3.5 cm. longis 1–1.5 cm. latis apice obtusis interioribus angustioribus; staminibus numerosis (\pm 400), antheris oblongis exterioribus 4.5 mm. longis obtuse apiculatis, interioribus brevioribus obtusis, filamentis filiformibus vel paullo complanatis; radiis stigmaticis \pm 14, cuneatis apice rotundatis.

BRITISH NEW GUINEA: Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8437 (TYPE), December 1936, plentiful in a permanent waterhole (flowers deep blue, 7–8 cm. diameter).

This collection seems to be most nearly related to *Nymphaea Casparyi* Rehnelt & Henkel. It differs in the thicker leaves with less remotely dentate margin and longer teeth, and the obviously elevated venation on the lower surface. The petals are mostly inserted just above the sepals, only four narrow ones being slightly higher. The stamens are massed in a ring surrounding the stigmatic rays. This may be one of the plants included in *N. gigantea* Hook. in earlier works, but the present tendency is to limit this species to those plants having very large flowers.

***Barclaya* Wallich**

***Barclaya Motleyi* Hook. f.** Trans. Linn. Soc. **23**: 157, *t.* 21, *f.* 1–5. 1860; Becc. in D'Albertis' New Guinea **2**: 396. 1881; F. v. Muell. Pap. Pl. **2**: 3. 1885; Pulle, Nov. Guin. Bot. **8**: 361. 1910.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13604, March 1939, alt. 850 m., massed in muddy deeply shaded pools in rain-forest streams, totally submerged except the open flowers (leaves brown; petals green).
BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7072, June 1936, alt. 100 m., massed in beds of shallow muddy or gravelly streams in forest, scarcely distinguishable from the decaying leaves of the stream bottoms (leaves blackish green appearing brown under water; sepals brown; petals brown-green).

These collections vary from the Bornean material in having obovate-oblong leaves with less pubescence on the lower surface. Some of the plants are larger than any seen in the Bornean collections, the leaves are 6.5–20 cm. long, 3.5–14.5 cm. broad.

CERATOPHYLLACEAE

***Ceratophyllum* Linnaeus**

***Ceratophyllum submersum* Linn.** Sp. Pl. ed. 2, 1409. 1763; van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 103. 1933.

BRITISH NEW GUINEA: coast between Oriomo and Fly Rivers, *Brass* 6458, April 1936, massed in open water in *Melaleuca Leucadendron* swamp-forest (plant brown). According to van Steenis, the species has been found only once in Malaysia, in Java at low altitudes.

CONNARACEAE

Rourea Aubl.*Rourea simulans* sp. nov.

Frutex magnus scandens, ramulis novellis ferrugineo-tomentosis; foliis imparipinnatis, petiolo rhachique 7–12 cm. longis pubescentibus; foliolis 3–5-jugis suboppositis vel interdum subalternis breviter petiolatis, oblongo-lanceolatis basi rotundatis apice acutiusculis vel breviter obtuse acuminatis, 1.5–7.5 cm. longis et 0.8–2.5 cm. latis, supra subglabris brunnescentibus subnitidulis subtus glaucescentibus conperse pubescentibus, costa supra impressa subtus prominente atque subtomentulosa, nervis primariis utrinsecus 6–10 patentibus circiter 3 mm. a margine arcuatim anastomosantibus; inflorescentiis paniculatis \pm 4 cm. longis terminalibus axillaribusque plerumque pluribus aggregatis in axillis; axi, ramis, pedicellis calycibusque breviter hirtellis; sepalis ovatis vix 2 mm. longis obtusiusculis; petalis circiter 5 mm. longis; staminibus brevissimis.

BRITISH NEW GUINEA: Lower Fly River (east bank), Gaima, *Brass* 8288 (TYPE), November 1936, rain-forest borders (large climbing shrub; flowers white).

The species is very closely allied to *Rourea Radlkoferiana* K. Schum. It differs in the softly tomentose new branchlets, the pubescent or hirtellous leaf-rhachis, the leaflets sparsely pubescent beneath and only shortly acuminate or acutish; the axis of the inflorescence and the calyx are hirtellous. We are not, as yet, wholly convinced that *Santaloides* (L.) Schellenberg is anything more than a geographical segregate; for this reason we have described the new species in *Rourea*.

LEGUMINOSAE

Archidendron F. von Mueller

With practically no material for comparison, and no key to the species of the genus already described, it has been very difficult to determine our material of *Archidendron* F. v. Muell. from descriptions only. Harms very distinctly states that he includes *Hansemannia* K. Schum. in *Archidendron* F. v. Muell. but does not transfer the species already described in the former genus. From the literature and the material at hand, we are wholly in agreement with the single generic concept; however, on account of the variability in our collections, we are transferring to *Archidendron* only those species of *Hansemannia* which have points of contact with our material.

Archidendron Schlechteri Harms, Bot. Jahrb. 55: 40. 1917.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 14054, April 1939, alt. 50 m., common marginal tree in flooded rain-forests of river plain (plant 8–10 m. high; flowers white, in supra-axillary panicles).

Apart from the somewhat shorter and stouter inflorescence branches, this collection agrees very well with the isotype. Another collection either belonging to or closely allied with this species is *Brass* 8006, Lower Fly River, east bank opposite Sturt Island, October 1939, rain-forest (flowers white; inflorescence lateral on branchlets and smaller branches). This differs from the other collection in having a slightly shorter and more

campanulate calyx, a little narrower and longer corolla, and lateral inflorescences. All are very closely allied to *Archidendron Lucyi* F. v. Muell. of Queensland, which has slightly larger flowers. Our material is too scanty to estimate the amount of variation within species of the genus.

Archidendron gawadense (Bak. f.) comb. nov.

Hansemannia gawadensis Bak. f. Jour. Bot. **61**: Suppl. 13. 1923.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7351, July 1936, alt. 100 m., undergrowth of river flood-plain forest (slender tree 5 m. high; leaves scattered along the upper 2 m. of stem; flowers white, in numerous fascicles axillary or lateral between the leaves).

This is Baker's own determination. Since he gives no clue in the original description to the species affinity, we note that, as far as may be judged from their descriptions, the species is close to *A. graciliflorum* Harms and *A. parviflorum* Pulle. In the collection cited, the inflorescence-axis is about 3 cm. long, and the flowers are crowded at the apex.

Archidendron Ledermannii Harms, Bot. Jahrb. **55**: 42. 1917.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13822, alt. 50 m., frequent in rain-forest on low lying alluvial soil (tree 2-3 m. high, branched or not; inflorescence on lower stem). Described from Northeastern New Guinea.

Archidendron papuanum sp. nov.

Arbor \pm 7.5 m. alta glabra; ramulis novellis viridescentibus; petiolo 10 cm. et rhachi primaria 8 cm. secundariaque 7-10 cm. longis; pinnis bijugis; foliolis 2-3-jugis ellipticis 7-11 cm. longis, 4-5.5 cm. latis, basi obtusis vel subrotundatis apice obtusiusculis, costa utrinque conspicua, nervis primariis utrinsecus \pm 5 utrinque prominulis, reticulo distincte manifesto; petiolulis 2 mm. longis in sicco atrofusci, glandulis interpetiolaribus interrachideisque applanatis vel depressis; inflorescentiis lateralibus (in specimine typico) 7 cm. longis; ramis brevibus; pedicellis 3 mm. longis; calyce campanulato 6 mm. longo breviter irregulariter lobulato; corolla (in alabastro apiculata) 1.5 cm. longa apice in lobis lanceolatis fissa; tubo stamineo in parte inferiore cum corolla connato; ovariis 5 stipitatis glabris.

BRITISH NEW GUINEA: Vailala River, Ihu, *Brass* 1110 (TYPE), March 1936, on riverbank (spreading glabrous tree 25 feet tall; large very dark green bipinnate leaves; petiole at insertion on stem and petiolules at insertion on rhachis much swollen; conspicuous white flowers on last year's wood).

Possibly this species is related to *Archidendron incurvatum* Lauterb. & K. Schum., but the calyx-tube is almost twice as long, and the leaflets are not acuminate.

Archidendron megaphyllum sp. nov.

Arbor sine ramis 14 m. alta; foliis \pm 1 m. longis; pinnis unijugis; petiolo 20 cm. et rhachi pinnae 66 cm. longis minute pubescentibus; foliolis 5-jugis superioribus late ellipticis 25 cm. longis, 15 cm. latis, basi inaequilateralibus apice obtusiusculis apiculatis, supra in costa nervisque minute pubescentibus, subtus in costa nervisque dense in lamina conperse ferrugineo-pubescentibus, costa supra plana subtus elevata, nervis primariis utrinsecus \pm 6 supra manifestis subtus prominulis, venulis subtus subclathratis, reticulo supra inconspicuo subtus distincto; petiolulo 1 cm. longo; inflorescentiis lateralibus brevibus, axi 3-4 cm. longo; calyce 3-4 mm. longo

pubescente; corolla puberula; legumine \pm 7 cm. longo, 2 cm. lato, inconspicue breviter tomentoso, valvis valde coriaceis; seminibus verisimiliter 7-8 nigris oblongis, 1.5 cm. longis, vix 1 cm. latis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7227 (TYPE), July 1936, alt. 100 m., rain-forest substage, rare (unbranched tree 14 m. tall, with a few large leaves \pm 1 m. long, forming a scant crown, and several thick twisted pods in fascicles on the stem).

Perhaps this species is related to *Archidendron molle* (K. Schum.) comb. nov. (*Hansemannia mollis* K. Schum. Bot. Jahrb. **9**: 202. 1888—published as a separate 1887). It differs from the latter species in that the leaves are not oblong nor densely pubescent on either side, and the calyx is not glabrous.

Serianthes Bentham

Serianthes minahassae (Koorders) comb. nov.

Albizzia minahassae Koord. Mededeel. Lands Plant. **19**: 416-419. 1898 (Fl. N. O. Celeb.); Suppl. Fl. N. O. Celebes **1**(1): 13, t. 4. 1918.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Neth. Ind. For. Serv. bb.* 25681, *Brass* 13970, *Brass & Versteegh* 13546, July 1938, April 1939, alt. 50 and 100 m., rain-forest of flood plains, common on higher inundation levels (flat-topped tree up to 30 m. high; fruit dark brown); 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13182, April 1939, alt. 750 m., primary rain-forest, frequent on the slopes (tree 32 m. high, 49 cm. diameter; flowers yellow-brown; fruit dark brown). SOLOMON ISLANDS: B o u g a i n v i l l e : Koniguru, Buin, *Kajewski* 2143, August 1930, alt. 900 m., rain-forest (very large tree up to 35 m. high. Used for rafters in ceremonial houses). Previously known from the Celebes.

Serianthes Ledermannii Harms, Bot. Jahrb. **55**: 43. 1917; C. T. White, Jour. Arnold Arb. **10**: 219. 1929.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7349, July 1936, alt. 100 m., forests of river flood-banks (tree attaining 30 m.; crown umbrella-shaped; trunk narrowly spurred; bark brown, lenticellate; wood pale, yellowish, with a nauseating odor; leaflets smooth and shining above, underside grey) (det. E. G. Baker); Lower Fly River, east bank opposite Sturt Island, *Brass* 8076, October 1936, rain-forest, occasional on banks of river (conspicuous tree up to 20 m. tall; branches erect and eventually flat-spreading from a short grey stem; leaflets smooth and shining above, grey below; flowers white; pods brown pubescent).

The following is a brief description of the pod (scarcely mature): 16 cm. long, 3.9 cm. broad, finely pubescent to glabrate and inconspicuously veined, epicarp very thin, brown, not easily removed, endocarp subligneous, 1 mm. thick; seeds 8-10, dark brown.

Pithecellobium Martius

Pithecellobium palauense Kaneh. Bot. Mag. Tokyo **48**: 733, f. 3. 1934 (October).

Pithecolobium palauense Hosokawa, Trans. Nat. Hist. Soc. Formos. **24**: 414. 1934 (November).

SOLOMON ISLANDS: S a n C r i s t o b a l : Waimamura, *Brass* 2665, August 1932, coast rain-forest on coral limestone, common (handsome spreading tree 25 m. tall; pale brown lenticellate bark; branchlets and leaves very dull dark green; flowers white, with long thin contorted stamens).

A comparison of Hosokawa's description with that of Kanehira's, published a month earlier, leaves no doubt that the two are identical. The greatest discrepancy is in the description of the pod and this we attribute

to a difference in the age of the fruits in each collection. The flowers and the leaves of the Solomon Islands collection are a little larger and the axis of the inflorescence is slightly pubescent, but we cannot see any specific differences between the two. Both grow on coral limestone.

***Pithecellobium novo-guineense* sp. nov.**

Arbor 6-9 m. alta; ramulis griseo-brunnescentibus glabris; foliis bipinnatis; petiolo 6-11 cm. et rhachi primaria 5-9 cm. secundariaque 6-13 cm. longis; pinnis 2-jugis; foliolis 2-4-jugis glabris oppositis ellipticis 6-12 cm. longis, 3.3-6 cm. latis, basi anguste rotundatis apice breviter acuminatis, costa subtus prominente, nervis primariis utrinsecus \pm 6 patentiadscendentibus prope marginem arcuatis, supra manifestis subtus prominulis, reticulo utrinque distincto; petiolulis vix 3 mm. longis; glandulis interpetiolaribus; inflorescentiis verisimiliter lateralibus, axibus 3-4 fasciculatis usque 25 cm. longis; floribus probabiliter sessilibus; calyce circiter 3.5 mm. longo puberulo, tubo anguste campanulato, dentibus brevibus acutis; corolla 1 cm. longa fere glabra, lobis circiter $\frac{1}{2}$ tubi longitudinem aequantibus; filamentis exsertis; ovario glabro breviter stipitato; legumine valde incurvato circiter 7 cm. longo, 8 mm. lato, margine inferiore late crenulato, seminibus \pm 10 oblongis 6 mm. longis, 4 mm. latis, leviter compressis in sicco brunnescentibus in margine convexo atrobrunnescentibus.

BRITISH NEW GUINEA: Kappa Kappa, *Brass* 824 (TYPE), December 1925, coast brushes (tree 20-30 feet tall; fruit bright red).

Although the specimen is somewhat broken, we are unable to place it among the named species of *Pithecellobium*. Two inflorescences are unattached but their bases suggest that they were lateral rather than axillary, as in *P. caulostachyum* Merr. of the Philippines. All the flowers are loose, but the two fruits both have remnants of the flower persisting, and these are sessile.

***Pithecellobium Clypearia* var. *velutinum* var. nov.**

Differt a forma typica foliolis subtus dense fulvo-velutinis; pedicellis 5 mm. longis.

BRITISH NEW GUINEA: Ononge Road, Dieni, *Brass* 3932 (TYPE of var.), April-May 1933, alt. 500 m., rain-forest (slender grey barked tree 20 m. tall; leaves smooth above, covered with pale brown hairs beneath; flowers pale greenish yellow; pods red).

This collection very closely resembles both *Pithecellobium Clypearia* Benth. and *P. angulatum* Benth. It has the obtusish leaflets of the first and the long pedicels of the second. It differs from both in the dense indument on the lower surface of the leaves, but appears to be more like that of the first in the quality of the pubescence. The foliar glands are very short-stipitate or subsessile. Certainly it does not wholly coincide with either specific concept as at present delineated. Perhaps it is a species in its own right, but more material for comparison would be necessary to establish this.

***Albizzia* Durazzini**

Albizzia retusa Benth. in Hook. Lond. Jour. Bot. **3**: 90. 1844; Merr. Enum. Philip. Fl. Pl. **2**: 247. 1923.

Albizzia littoralis Teysm. & Binn. Nat. Tijdschr. Ned. Ind. **29**: 259. 1867; Val. Bull. Dept. Agric. Ind. Neerl. **10**: 16. 1907.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13988, April 1939, alt. 50 m., frequent in rain-forest subject to flooding (large buttressed tree attaining a height of 30 m.; flowers white with red stamens). BRITISH NEW GUINEA: Lower Fly River (east bank), Gaima, *Brass* 8316, November 1936, rain-forest second growths (one example — tree 10 m. high; leaflets greyish beneath; flowers white with purple stamens).

The material seems to correspond fairly well with this Malaysian species. It has previously been reported from Netherlands New Guinea under the name of *A. littoralis* Teysm. & Binn.

Albizzia falcata (L.) Backer, Voorl. Schoolfl. Java 109. 1908; Beknopte Fl. Java Afl. 5. Fam. 119: 10. 1941.

Adenanthera falcata Linn. in Stickman Herb. Amb. 14. 1754, Amoen. Acad. 4: 124. 1750.

Albizzia moluccana Miq. Fl. Ind. Bat. 1(1): 26. 1855.

This species, already recorded from New Guinea several times under the name of *A. moluccana* Miq., is represented in our herbarium by the following numbers: *Neth. Ind. For. Serv.* bb. 22225, *Brass & Versteegh* 11176, 11176A, 12575, 13141, *Brass* 576, 5397, 8359, *Clemens* 935. From the Solomon Islands we have: Bougainville: *Kajewski* 1937, *Waterhouse* 94 (ser. no. 22698); Ysabel: *Brass* 3223.

Albizzia lebbekioides (DC.) Benth. in Hook. Lond. Jour. Bot. 3: 89. 1844.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5858, January–March 1934, alt. 20 m., few trees scattered over small area on savanna (tree 7–8 m. tall, thickly foliated; branches drooping; hard grey bark; flowers numerous in greenish white globose heads) (det. van Steenis). A Malaysian species seemingly recorded for the first time in New Guinea.

Acacia Willdenow

Acacia aulacocarpa var. ***macrocarpa*** Benth. Fl. Austr. 2: 410. 1864.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 6017, 6024, January–March 1934, alt. 30 m., abundant in savanna forests (grey foliated shapely tree attaining large size; rough grey fissured bark) (det C. T. White).

This and the two following species are apparently Australian species native also in New Guinea.

Acacia crassicarpa A. Cunn. ex Benth. in Hook. Lond. Jour. Bot. 1: 379. 1842; F. M. Bail. Queensl. Fl. 2: 511. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8699, 8718, December 1936, January 1937, distinctive tree of brownish appearance forming a large part of both savannah and light rain-forests on low ridges of clay along the river (shapely tree attaining 20 m.; bark dark grey, hard, deeply fissured, inner bark red; wood yellowish); Lake Daviumbu, Middle Fly River, *Brass* 7673, September 1936, plentiful on lake shores in rain-forest and in contact zone of rain-forest and savannahs) (det. E. G. Baker). Northern Australia, Queensland.

Acacia leptocarpa A. Cunn. ex Benth. in Hook. Lond. Jour. Bot. 1: 376. 1842; F. M. Bail. Queensl. Fl. 2: 510. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8531, common on savannah forest ridges (tree 10–12 m. high with hard deeply fissured grey bark); Gaima, Lower Fly River (east bank), *Brass* 8257, open savannah forests (tree 6–8 m. high, usually in groups; bark rough, deeply fissured; phyllodes somewhat glaucous) (det. E. G. Baker). Queensland.

Acacia Mangium Willd Sp. Pl. 4: 1053. 1806; F. M. Bail. Queensl. Fl. 2: 513. 1900.

NETHERLANDS NEW GUINEA: Agonda, *Neth. Ind. For. Serv.* bb. 22332 (det. van

Steenis). BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5696, 5697, common tree of tall savannah and about rain-forest borders (det. C. T. White).

Probably the same plant was reported by F. von. Mueller from Papua as *Acacia holosericea* A. Cunn. For a discussion of the nomenclature and synonymy, cf. C. T. White, *Contr. Arnold Arb.* 4: 42. 1933. Already known in the northern regions of Australia and in Malaysia.

Acacia pennata (Linn.) Willd. Sp. Pl. 4: 1090. 1806; Merr. Enum. Philip. Fl. Pl. 2: 249. 1923.

Mimosa pennata Linn. Sp. Pl. 522. 1753.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13776, 13916, 14098, April 1939, alt. 50 m., very abundant in low growths fringing creeks on deeply flooded river plain (large prickly scandent shrub; flowers white). Tropical Asia, Malaysia, Africa. Not previously reported from Papuasia.

Adenanthera Linnaeus

Adenanthera microsperma Teysm. & Binn. Nat. Tijdschr. Nederl. Ind. 27: 58. 1864; Koord. & Val. Mededeel. Lands Plant. 11: 279 (Bijdr. Boomsoort. Java 1: 279). 1894.

NETHERLANDS NEW GUINEA: Hollandia, Bernhard Camp, *Neth. Ind. For. Serv.* bb. 25744, August 1938, alt. \pm 500 m.; Bernhard Camp, Idenburg River, *Brass & Versteegh* 13567, April 1939, alt. 570 m., frequent in primary rain-forest (tree 28 m. high, 45 cm. diameter; flowers yellow; fruits green). The first specimen cited was identified by van Steenis. We have not yet found any other record of the species in New Guinea.

Piptadenia Bentham

Piptadenia novo-guineensis Warb. Bot. Jahrb. 13: 453. 1891; Rechinger, *Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien* 89: 557. 1913; C. T. White, *Jour. Arnold Arb.* 10: 219. 1929.

Schleinitzia microphylla Warb. op. cit. 336.

SOLOMON ISLANDS: San Cristobal: Magoha River, *Brass* 2736, August 1932, common in rain-forests (very handsome spreading tree 20 m. high, with brown fissured bark; petals white; stamens pink with yellow anthers); Balego-Nagonago, *Brass* 2698, August 1932, alt. 350 m., common in rain-forests on crest of spurs (handsome tree attaining a very large size and towering above most other trees in the hill forests). These Solomon Islands collections differ from the New Guinean material only in the new growth being more pubescent. Previously reported from New Guinea and Bougainville.

Parkia R. Brown

Parkia Versteeghii sp. nov.

Arbor usque 35 m. alta; ramulis brunnescentibus puberulis lenticellatis; foliis bipinnatis; petiolo 5-7 cm. longo puberulo supra basim glandulam ellipticam concavam ferente, rhachi 17-23 cm. longa patenti-pubescente vel glabrescente, rhachibus secundariis 6-10 cm. longis patenti-pubescentibus, trichomis brunnescentibus; pinnis 10-16-jugis suboppositis, glandulis inter superiores parvis concavis ellipticis vel suborbicularibus; foliolis 4-7 mm. longis, 2-3 mm. latis, 15-30-jugis utrinque consperse pubescentibus vel glabris oblongis obtusis minute apiculatis basi suboblique truncatis angulis obtusis margine leviter recurvatis, costa utrinque prominula, nervis primariis utrinsecus 4-5 subobscuris; inflorescentiis dense capitatis pyriformibus ad anthesim 3.5-4 cm. longis, 2.3-2.5 cm. latis; pedunculo 12-25 cm. longo angulato; bracteolis anguste spatulatis apice concavo obtusis dorso hir-

tellis; floribus basi breviter stipitatis, stipite circiter 2 mm. longo pubescente; calycis tubo \pm 7 mm. longo, lobis extus pubescentibus 2 posticis concavis vix 1.5 mm. diametro crassiusculis, 3 anticis vix 1 mm. diametro tenuibus; petalis 5, lineari-oblongis obtusiusculis apice versus extus puberulis basim versus cum tubo stamineo adnatis; filamentis basi connatis in parte libera \pm 8 mm. longis (in floribus neutris multo longioribus versus apicem consperse pilosulis), antheris anguste oblongis; ovario longe stipitato apice parce pilosulo, stylo glabro.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13824, *Brass & Versteegh* 14020 (TYPE), April 1939, alt. 50 and 75 m., rain-forest, common on swampy edges of river flood plain (canopy tree 28–35 m. tall; flowers cream-color or yellowish; heads pendent).

The genus appears to be new for New Guinea. The species is perhaps closely related to *Parkia speciosa* Hassk. of Malaya and Sumatra; it differs in the larger pyriform heads and the suboblique and less distinctly veined leaflets.

Cynometra Linnaeus

?*Cynometra novo-guineensis* sp. nov.

Arbor vel frutex; ramulis tenuibus atrofuscis glabris; foliis brevissime petiolatis, petiolo 4–6 mm. longo ruguloso; foliolis unijugis oblique interdum late lanceolatis 4–7 cm. longis, 1–3 cm. latis, utrinque fere aequaliter angustatis basi cuneatis obliquis apice late acuminatis, acumine \pm 1 cm. longo, 3–5 mm. lato emarginato, glabris, nervis costa excepta inconspicuis; inflorescentiis axillaribus subumbellatis paucifloris; bracteis circiter 1 mm. longis obtusis striatis; pedicellis 4 mm. longis glabris; sepalis 5 oblongo-lanceolatis subirregularibus vix 2 mm. longis versus basim \pm connatis; petalis minimis (uno tantum viso); staminibus 10, antheris late ellipticis minute apiculatis; ovario brevissime stipitato versus apicem conspersissime piloso, stylo glabro; fructibus non visis.

NETHERLANDS NEW GUINEA: Hollandia, Bernhard Camp, *Neth. Ind. For. Serv.* bb. 25712 (TYPE), August 1938, alt. 50 m.

This species somewhat resembles *Cynometra Warburgii* Harms of the Philippines, but in the former the axis of the inflorescence is more reduced, the leaflets are broader and very inconspicuously veined.

Maniltoa Scheffer

Maniltoa cynometroides sp. nov.

Arbor parva; ramulis brunnescentibus lenticellatis; petiolo 5–7 mm. longo ruguloso, rhachi 5–7 mm. longa minute puberula; foliolis bijugis sessilibus vel subsessilibus valde inaequilateralibus late obovato-cuneatis (terminalibus 2.8–4 cm. longis 1.8–2 cm. latis, lateralibus 1.9–2.9 cm. longis 0.8–1.3 cm. latis) a medio basim versus sensim angustatis apice rotundatis vel suboblique truncatis summo breviter obtuseque emarginatis, costa a margine antico 2–5 mm. distante, nervis primariis inconspicuis; inflorescentiis terminalibus et in axillis foliorum superiorum, non visis; axi circiter 5 mm. longo minute pubescente; pedicello vix 1 cm. longo crasso minute pubescente; staminibus 20 vel ultra; legumine arcuatim complanato-ovoideo immaturo 2 cm. longo, 1.5 cm. lato.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass*

6903 (TYPE), June 1936, alt. 100 m., one of the smaller trees of ridge-forest canopy layer, common (pods unripe; flowers not seen).

The plant immediately suggests *Cynometra* Linn., but at the base of two fruits a partial ring of stamens still adheres. These are in two rows; there are at least 20 on the fruits, we cannot be sure how many more there may have been in the flowers. From the dried parts of the calyx casually adhering, we assume that the flower is glabrous.

***Maniltoa plurijuga* sp. nov.**

Arbor 24-29 m. alta; ramis glabris; ramulis petiolis rhachibusque ferrugineo-hirtellis; petiolo \pm 1 cm. et rhachi 6-15 cm. longis; foliis 7-14-jugis sessilibus valde inaequilateraliter oblongis vel oblongo-sub-rhomboides 2.5-4 cm. longis, 8-10 mm. latis, basi latere postico rotundato-obtusis apice obtusiusculis sub apice 1-3 mm. emarginulatis, costa circiter 2 mm. a margine antico distante subtus nonnumquam parce hirtella, nervis primariis reticuloque supra leviter impressis subtus inconspicuis; ceteris ignotis.

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13539* (TYPE), April 1939, alt. 650 m., rare tree of primary rain-forest on slope of ridge (24 m. high, 48 cm. diameter; bark black); Bernhard Camp, Idenburg River, *Brass & Versteegh 14007*, April 1939, alt. 140 m., frequent on ridges of primary rain-forest (tree 29 m. high, 55 cm. diameter).

Here we have departed from our usual custom not to describe sterile specimens even when we are fairly sure that they represent new species. These collections, however, appear to be well marked by foliar characters. Their alliance is with *Maniltoa urophylla* Harms, but the leaflets are definitely not acuminate, a character which Harms emphasizes in the specific name chosen, in the original description, and also in the comment following it.

***Maniltoa Brassii* sp. nov.**

Arbor gracilis \pm 9 m. alta; ramulis brunnescentibus copiose lenticellatis; petiolo 8-10 mm. longo glabro, rhachi 4-14.5 cm. longa lenticellata; foliis 3-4-jugis subsessilibus oblique lanceolatis (6-)8-16 cm. longis, (2.5-)3-5.5 cm. latis, basi inaequilateraliter obtusis latere postico subrotundatis vix auriculatis apice obtuse acuminatis, acumine emarginato, costa a margine antico 0.8-1.5 cm. distante, nervis primariis in latere postico 7-11 utrinque prominulis, reticulo laxo supra inconspicuo subtus distincto; inflorescentiis densifloris terminalibus axillaribusque sessilibus probabiliter subglobosis, 6 cm. latis, axi circiter 6 cm. longo ferrugineo-pubescente; bracteis ovatis acutis \pm 3 cm. longis inferis glabris superioribus pubescentibus; pedicellis 3-5 mm. longis pubescentibus basi bibracteolatis, bracteolis \pm 1 cm. longis oblongis subcarinatis in costa margineque pubescentibus; receptaculo circiter 5 mm. longo utrinque pubescente; sepalis 4 inaequalibus \pm 14 mm. longis extus minute pubescentibus vel glabratis; petalis non visis; staminibus \pm 45, filamentis basi pubescente connata excepta glabris, antheris 2 mm. longis minute apiculatis; ovario sessili dense pubescente, stylo 2.5 cm. longo basi pubescente, stigmatibus subcapitellato.

BRITISH NEW GUINEA: Central Division, U-uma River, *Brass 1428* (TYPE), May 1928, in light rain-forests (tall slender tree 30 feet or more).

In the compact inflorescence, and in the union of the stamens above the

usual ring at the base, this species apparently is related to *Maniltoa megalolephala* Harms; nevertheless, it is distinct in several characters. The lower part of the filaments seems to be more or less united with the pubescent cupular receptacle or calyx-tube; the pedicels are unusually short, likewise the bracts at their base; and the densely pubescent ovary is not stipitate.

Kingiodendron Harms

Kingiodendron alternifolium (Elmer) Merr. & Rolfe, Philip. Jour. Sci. **4**: 267. 1909; Merr. Enum. Philip. Fl. Pl. **2**: 255. 1923.

Cynometra alternifolia Elmer, Leaf. Philip. Bot. **1**: 223. 1907.

Hardwickia alternifolia Elmer, op. cit. 362. 1908.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8004, 8101, October 1936, rain-forest, on river flood plains (large canopy tree with hard grey shallowly fissured bark; flowers greenish or white). Probably *Neth. Ind. For. Serv. bb. 28911*, Hollandia, August 1939, also belongs here.

In 1936 B. L. Burt described a species of *Kingiodendron* from the Solomon Islands and one from Fiji. This seems to be the first time the genus has been found in New Guinea. These collections, determined by E. G. Baker, are a very good match for the Philippine material of this species.

Crudia Schreber

Crudia subsimplicifolia Merr. Philip. Jour. Sci. Bot. **5**: 39. 1910, Enum. Philip. Fl. Pl. **2**: 256. 1923.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8182, undergrowth of flood-plain rain-forest (nondescript tree 3–4 m. high) (det. E. G. Baker); Vailala River, Ihu, *Brass* 908, rain-forests (tall buttressed tree with scaly pale brown bark and hard brown wood; inflorescence racemose, terminal on lateral shoots).

Type from the Philippines; the genus appears to be new to Papuan records. The first cited collection compares favorably with *Wenzel 1252*, a collection without fruit from the Philippines; the leaves, however, are somewhat more coriaceous and the inflorescence is more elongated. In *Brass* 908 the pods are elliptic, apiculate, 7 cm. long, 4 cm. wide, more mature than in the other Papuan collection, and the apex is a little less excentric.

Bauhinia Linnaeus

Bauhinia Schlechteri Harms, Bot. Jahrb. **55**: 55. f. 3. 1918.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13951, April 1939, alt. 50 m., frequent in rain-forest of river flood-plains (tree \pm 20 m. high, 35 cm. diameter; flowers conspicuous and pleasantly fragrant, petals white, the two lower ones orange-red at base. Type from Northeastern New Guinea.

Bauhinia monandra Kurz, Jour. As. Soc. Beng. **42**(2): 73. 1873, For. Fl. Brit. Burma **1**: 395. 1877.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5652, alt. 100 m., growing thickly on old garden clearings, probably introduced (large bush or small tree; numerous showy flowers, standard pale pink heavily marked with red, other petals pale pink) (det. C. T. White). Introduced.

Mezoneurum Desfontaines

Mezoneurum Scortechinii F. v. Muell. in Wing's South. Sci. Rec. **2**: 73. 1882; F. M. Bail. Queensl. Fl. **2**: 451. 1900.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7498, August 1936, rain-forest (large liane ascending to the tree-tops; leaflets grey beneath; flowers yellow).

This is a Queensland species seemingly collected for the first time in New Guinea. Another species in Papuaia, *Mezoneurum Peekelii* Harms, allied to those of Malaysia, was described from the Bismarck Archipelago.

Ormosia Jackson

Ormosia calavensis Azaola in Blanco Fl. Filip. ed 2: 230. 1845; Prain, Jour. As. Soc. Beng. 69(2): 180. 1900 (Bot. Notes Papil. 390. 1901); Merr. Enum. Philip. Fl. Pl. 2: 269. 1923; Kaneh. Bot. Mag. Tokyo 45: 285. 1931, Fl. Micrones. 144, f. 49. 1933.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 13599, April 1939, alt. 300 m., rare on slopes in primary rain-forest (tree 24 m. high, 55 cm. diameter; fruit black). BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7514, August 1936, rain-forest, rare (tree 14 m. high; leaves somewhat glaucous below; numerous stiff fruiting panicles erect at apex of crown; seeds red) (det. E. G. Baker).

This species is one of the most wide-spread of the genus, having been collected in the Philippines, the Moluccas, Palau Island, and now New Guinea.

Gompholobium Smith

Gompholobium papuanum sp. nov.

Frutex gracilis rigens 1.5 m. altus glaber; ramulis atrobrunnescentibus; foliis pinnatis; petiolo rhachique 9–13 mm. longis; stipulis minute subulatis caducis; foliolis 11–15 paribus suboppositis lineari-oblongis vel lanceolatis, 7–12 mm. longis, 1–2 mm. latis, basi acutis apice acutis apiculatis margine revolutis, supra atro-viridescentibus subtus pallidioribus, nervis inconspicuis vel obscuris; petiolulis 0.5 mm. longis; floribus solitariis in ramulis brevibus terminalibus pedicellatis; pedicellis \pm 5 mm. longis minute bracteolatis; calyce 1 cm. longo, lobis 5 lanceolatis acutis basi 3 mm. connatis; petalis verisimiliter persistentibus, vexillo late reniformi unguiculato apice emarginato 1.3 cm. lato, 1.1 cm. longo includente unguiculum 2 mm. longum, alis oblongis 9 mm. includente 1.5 mm. unguiculum longis, 2.5 mm. latis, carina 1.1 cm. incl. 2.5 mm. unguiculum longa, 4 mm. lata; legumine depresso ovoideo 5 mm. longo, 8 mm. lato, subsessili (stipite 0.5 mm.), 6-ovulato, seminibus subreniformibus vix 3 mm. latis, 1.5 mm. longis, strophiole minimo corrugato hyalino hilum circumdante.

BRITISH NEW GUINEA: Wassi Kussa River, Tumbuke, *Brass* 8432 (TYPE), December 1936, occasional in *Agonis* scrubs (stiff slender shrub 1.5 m. high; persistent petals yellow).

A species evidently related to *Gompholobium nitidum* Benth., but the leaflets are not oblong-cuneate nor emarginate. Apparently this is the first report of the presence of this Australian genus in Papuaia.

Tephrosia Persoon

Tephrosia leptoclada Benth. Fl. Austr. 2: 207. 1864; F. M. Bail. Queensl. Fl. 2: 393. 1900.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, *Brass* 8395, December 1936, savannah forest, common in clumps on ridges (undershrub; flowers red) (det. E. G. Baker). Previously known from Queensland.

***Tephrosia maculata* sp. nov.**

Frutex erectus usque 1 m. altus; ramulis pubescentibus pilis patentibus vel retrorsis; foliis breviter petiolatis, petiolo 5 mm. et rhachi 2.5–3 cm. longis patentibus-pubescentibus; stipulis setaceo-subulatis caducis; foliolis oppositis 3–4-jugis anguste oblongis vel leviter cuneatis, 1.7–3 cm. longis, 0.7 cm. latis, terminali paullo majore 3.5–4.5 cm. longo, 0.8–1 cm. lato, basi obtuse cuneatis apice leviter retusis supra parce subtus \pm dense pubescentibus, nervis primariis valde adscendentibus, petiolulis 1 mm. longis patentibus-pubescentibus; racemis in ramis brevibus terminalibus demum elongatis 2.5–(in fructu) 10 cm. longis; pedicellis 3–5 mm. longis pubescentibus; calyce patentibus-pubescente, tubo 1.5 mm. longo, lobis lineari-subulatis quam tubo paullo brevioribus; vexillo suborbiculari unguiculato 6 mm. longo, 4 mm. lato, extus pubescente, alis 5 mm. longis carinam superantibus; legumine 2.8 cm. longo, 4 mm. lato, fere recto; seminibus \pm 5 oblongis, 3 mm. longis, 2 mm. latis maculatis.

BRITISH NEW GUINEA: Nakeo District, Baroka, *Brass* 3703 (TYPE), April 1933, alt. 50 m., common on savannah forest grasslands (erect shrub with branched top, up to 1 m. tall; leaves greyish beneath; flowers pale purple).

This collection was determined by Mr. C. T. White as *Tephrosia* aff. *phaeosperma* F. v. Muell. This unquestionably is its relationship. Except on the lower surface of the leaflets, it has a spreading rather than a silky pubescence, the flower is slightly smaller than in the related species, and the seeds are mottled.

***Millettia* Wight & Arnott**

Millettia australis (Endl.) Benth. in Miq. Pl. Junghuhn. 250. 1852; Dunn, Jour. Linn. Soc. Bot. 41: 163. 1912.

Pterocarpus australis Endl. Prodr. Fl. Norf. 94. 1833.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8214, October 1936, rain-forest (very large flowering screening liane of riverbanks; petals violet, whitish beneath) (det. E. G. Baker).

Described from Norfolk Island, also reported from Queensland and New South Wales. Up to the present we have found, besides this, two records of *Millettia* Wight & Arn. in Papuasias; Dunn, op. cit. 237, excludes one of these from the genus, and the other is a doubtful record of his own, op. cit. 169, 170.

***Desmodium* Desvoux**

Although we have found no new species of *Desmodium* Desv., we are making the following brief record either to indicate range-extensions or older specific names than the ones in our New Guinea index of plants always bearing in mind that this is not a complete index: *Desmodium laxum* DC., *Brass* 911; *D. Muelleri* Benth., *Brass* 6522; *D. nemorosum* var. *simplex* Schindl., *Brass* 3788, 7911, 8344, 8653; *D. microphyllum* DC., *Brass* 3659, 5320; *D. trichostachyum* Benth., *Brass* 7526; *D. triflorum* (L.) DC., *Brass* 6347; *D. sequax* Wall. (*D. sinuatum* Bl.), *Brass* 5512, 11254, 11799; *D. zonatum* Miq., *Brass* 3516.

***Dalbergia* Linnaeus filius**

Dalbergia Albertisii Prain, Jour. As. Soc. Beng. 70(2): 62. 1901, Ann. Roy. Bot. Soc. Calcutta 10(1): 33. t. 5. 1904.

BRITISH NEW GUINEA: Lepokera, Vailala River, *Brass 990*, February 1926, low swampy rain-forests (large Rambler or climber; leaves pale green, shining above); Gulf Division, Keuru, *Brass 1202*, March 1926, common strand plant, occurring sometimes in the mangrove formations (rambling shrub or climber, glabrous; bark lenticellate; pods flat, 1- or 2-seeded).

The above collections suit well the original description of this species, which seems to be known only from the type-collection; the leaves tend to be a little more acuminate than those shown in the plate. The flowers are in bud: standard obovate-oblong, emarginate, 3.5 mm. long, 2 mm. broad, with a very short claw; wings and keel 3 mm. long, short unguiculate; stamens 10, in one sheath split on the upper side; ovary stipitate, sparsely pilose along the sutures, style short, ovules 2. *Dalbergia papuana* Pulle appears to be a close ally.

***Dalbergia novo-guineensis* sp. nov.**

Frutex magnus; ramulis brunnescentibus striatis crispe puberulis; stipulis minutis pubescentibus mox caducis; foliis 3-4 cm. longis imparipinnatis; petiolo 5-7 mm. et rhachi \pm 2 cm. longis parce crispe pubescentibus; foliolis \pm 7-jugis suboppositis vel subalternis oblongis 7-11 cm. longis, 2-3.5 cm. latis, apice obtusis basi rotundato-cuneatis interdum paullo inaequilateralibus utrinque glabris vel subtus costa margineque brevissime pilosis costa excepta inconspicue venosis; petiolulis 0.5 mm. longis; inflorescentiis brevissimis cum floribus 5 mm. longis, cum fructibus 1.5 cm. longis, axillaribus cymosis, axi pubescente; floribus basi bibracteatis, bracteis 0.5 mm. longis caducis; calyce, lobo postico subcarinato puberulo excepto, glabro 2 mm. longo, ceteris lobis rotundatis; vexillo obovato-oblongo 3 mm. longo, 2.5 mm. lato, basi cuneato vix unguiculato apice emarginato; alis carinaeque 2.5 mm. longis breviter unguiculatis; staminibus 10 connatis, tubo latere antico fisso, antheris parvis; ovario brevissime stipitato 1.5 mm. longo 2-ovulato, stylo brevissimo; legumine 1.5 cm. longo, 0.7 cm. lato, basi cuneato stipitato glabro venoso.

BRITISH NEW GUINEA: Vailala River, Maira, *Brass 1031* (TYPE), February 1926, overhanging the river (large bush with dark green pinnate leaves and flat green pods).

The species clearly belongs to the section *Sissoa*, but we cannot at present suggest any species which closely resembles it. Its chief characters are the small glabrous leaves, the very short inflorescence, and the small veined pods; the latter, however, are immature.

***Dalbergia rivularis* sp. nov.**

Scandens; ramulis atro-fuscis striatis glabris novellis tantum crispe pubescentibus; stipulis caducis; foliis 6-8 cm. longis imparipinnatis; petiolo \pm 1 cm. et rhachi 4-6 cm. longis crispule pubescentibus; foliolis 7-8-jugis suboppositis vel alternis late oblongis, 5-16 mm. longis, 3-8 mm. latis, proximalibus quam distalibus minoribus basi rotundatis inaequilateralibus apice paullo retusis vel truncatis supra consperse pilosis subtus praecipue in costa pilosis, nervis costa excepta inconspicuis; petiolulis 1 mm. longis pubescentibus; inflorescentiis axillaribus circiter 1.5 cm. longis; floribus non visis; calyce 3 mm. longo, lobis anticis 1.5 mm. longis subrotundatis, lateralibus 1.5 mm. longis acutis, lobo postico 2.5 mm. longo lineari-oblongo pubescente; legumine juvenili subfalcato basim versum in suturis crispe piloso, maturo \pm 5 cm. longo, 1.5 cm. lato, basi cuneato

stipitato apice rotundato apiculato, valde applanato inter semine leviter contracto supra semina valde reticulato; seminibus 1-3 reniformibus valde compressis brunnescentibus.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 14080 (TYPE), April 1939, alt. 50 m., common large liane in flooded rain-forest of river plains.

This species is closely allied to *Dalbergia ferruginea* Roxb., but it has smaller leaves, less copious inflorescence, and much sparser more crisped pubescence.

Dalbergia densa* var. *australis Prain, Ann. Roy. Bot. Gard. Calcutta **10**(1): 73. t. 54. 1904.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7751, September 1936, rain-forest (large profusely flowering canopy liane climbing by tendrillate branchlets; flowers white); Lower Fly River, east bank opposite Sturt Island, *Brass* 8042, 8088, October 1936, rain-forest, common on flood plains and river banks (profusely flowering large canopy climber; flowers white).

The leaflets are smaller and a few more to the leaf than in var. *typica* Prain, also the ovary is glabrous. Distribution according to Prain: Australia (Queensland and some islands).

Derris Loureiro

Derris elegans (Grah.) Benth. in Miq. Pl. Junghuhn. 252. 1852; Prain, Jour. As. Soc. Beng. **66**(2): 103. 1897; Merr. Enum. Philip. Fl. Pl. **2**: 299. 1923.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13913, April 1939, alt. 50 m., occasional marginal climber in flood-plain of river forest (flowers white). BRITISH NEW GUINEA: (det. E. G. Baker), Lower Fly River, east bank opposite Sturt Island, *Brass* 8024, 8232, on muddy river banks and in *Erythrina* swamp forests (common large climber; flowers pale pink or white). SOLOMON ISLANDS: Bougainville: Karngu, Buin, *Kajewski* 2259, 2290, October 1930, alt. 50 m., climbing well into the tops of rain-forest trees (vine with pendent racemes; flowers white. Vine used for lashing native houses). San Cristobal: Magoha River, *Brass* 2723, August 1932, lowland rain-forest, on swampy lands, common (very large liane with a profusion of sweet-scented white flowers). Malaysia.

Derris koolgibberah F. M. Bail. Rep. Bellenden-Ker Exped. 38. 1889; Queensl. Fl. **2**: 445. 1900.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8205, October 1936, climbing shrub on muddy river bank (det. E. G. Baker). Queensland.

Derris heptaphylla (L.) Merr. Interpret. Herb. Amboin. 273. 1917; Enum. Philip. Fl. Pl. **2**: 299. 1923.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5768, January-March 1934, very plentiful on river banks and often partially submerged in water backed up by tides (large rambling shrub with erect stiff panicles of greenish flowers) (det. E. G. Baker). India and Malaysia.

Strongylodon Vogel

Strongylodon Archboldianus sp. nov.

Planta glabra scandens; ramulis striatulis; petiolo 3-5 cm. longo supra canaliculato, rhachi 1-1.5 cm. longo, petiolulis 2 mm. longis; stipellis petiolulis subaequalibus, stipulis 2.5-3 mm. longis ovatis plurinerviis; foliis chartaceis vel subcoriaceis ovatis vel oblongo-lanceolatis 4-11 cm. longis, 1.5-5 cm. latis, lateralibus inaequilateralibus basi rotundato-cuneatis

apice obtuse acuminatis, acumine 1–1.5 cm. longo, e basi trinervatis, nervis lateralibus e costa irregulariter ortis utrinsecus 4 vel 5 utrinque perspicuis, reticulo utrinque prominulo; racemis axillaribus 8.5–21 cm. longis; pedunculo 4.5–5 cm. longo, nodis plerumque flores 3 gerentibus, rhachi puberula; bracteis 1–1.5 mm. longis nervatis; pedicellis \pm 1 cm. longis glabris apice bibracteolatis, bracteolis obtusis; calycis tubo 6 mm. longo, lobis brevibus obtusiusculis; vexillo oblongo-lanceolato usque 2.8 cm. longo, 1.4 cm. lato, apice retuso basi unguiculato, ungui 4 mm. longo, alis usque 2 cm. longis, 5 mm. latis, ungui 6 mm. longo, carina 2.5 cm. longa; ovario 5 mm. longo, \pm 9-ovulato, superiore margine puberulo, stipite 5 mm. longo; legumine cultriformi usque 12 cm. longo, 3 cm. lato, stipite 1 cm. longo, valvis coriaceis conspicue reticulatis margine superiore fere rectis inferiore leviter incurvis; seminibus 6 \pm compressis brunnescentibus.

NETHERLANDS NEW GUINEA: southern slopes of Grand Valley, *Brass* 9522, August 1938, alt. 2350 m.; 9 km. northeast of Lake Habbema, *Brass* 10755, 10881, October 1938, alt. 2700 m. and 2650 m., rain-forest of valley bottom, common in small openings and along streams; Bele River, 18 km. northeast of Lake Habbema, *Brass* 11429 (TYPE), November 1938, alt. 2200 m., common on forested banks of river; Balim River, *Brass* 11696, December 1938, alt. 1600 m., climbing on woody growths fringing a stream. A slender climber ascending to 2–3 m.; flowers orange-red.

Strongylodon Archboldianus is a possible ally of *S. pulcher* C. B. Rob. of the Philippines, but the latter has different colored flowers, a pubescent calyx, and larger leaves with more numerous veins. The species is amply distinct from the rather widespread *S. lucidus* Seem. in the foliar and fruiting characters, the latter having broader leaflets, and a shorter broader pod with one or two seeds.

Mucuna Adanson

Mucuna Baileyana sp. nov.

Planta magna scandens; ramulis petiolis rhachibus petiolulisque lutescenti-tomentosis demum glabratibus; petiolo 5 cm. et rhachi 2.5 cm. petiolulisque 5 mm. longis, stipellis subulatis 4 mm. longis; foliis suborbicularibus vel late ellipticis, 7–9 cm. longis, 5.5–8 cm. latis, basi rotundatis vel emarginatis lateralibus obliquis apice obtusiusculis, supra parce pubescentibus subtus breviter adpresse villosis vel subtomentosis, costa supra manifesta subtus prominula, venis primariis utrinsecus \pm 6 supra manifestis subtus prominulis; inflorescentiis axillaribus \pm 10 cm. longis racemosis subcorymbosis, pedunculo rhachi pedicellisque breviter tomentosis, pedunculo manifesto \pm 5 cm. et rhachi \pm 1 cm. pedicellisque 2 cm. longis; calyce dense pubescente et pilis urentibus hispido, tubo 6 mm. longo, lobo superiore emarginato 7 mm. longo, 5–6 mm. lato, lateralibus acutis 8 mm. longis, infimo lanceolato 9 mm. longo, 4 mm. lato acuminato; petalis viridescenti-albidis, vexillo obovato 2 cm. longo, 1.3 cm. lato, alis 2.5–3 cm. longis, basim versus margine inferiore barbatis, auriculis pubescentibus, carina 2.5 cm. longa; legumine circiter 15 cm. longo, 3.5 cm. lato alatas suturas 5 mm. includente, valvis oblique transversim lamellatis, lamellis 3–4 mm. latis; seminibus 5 compressis fuscis, 1.8 cm. longis, 1.4 cm. latis, 0.7 cm. crassis.

BRITISH NEW GUINEA: Vailala River, Ihu, *Brass* 1104 (TYPE), March 1926, common on banks of rivers (large climber, the whole plant pubescent; scattered bristly hairs on calyx; petals greenish white; pods covered with sharp easily detached bristles).

This is probably *Mucuna urens* var. *papuana* F. M. Bail. Queensl. Agric. Jour. **24**: 20. 1910, although the lobes of the calyx are at least twice as long as those described by Bailey, and the pod is a little larger. We do not believe it to be closely related to *M. urens* DC., an American species. It may be allied to *M. Stanleyi* C. T. White, but the flowers are smaller and the pubescence is finer.

***Mucuna discolor* sp. nov.**

Scandens; ramulis petiolisque glabrescentibus; petiolo \pm 4 cm. longo, petiolulis 6 mm. longis adpresse pubescentibus; foliis ovatis \pm 7 cm. longis, 4.5–5 cm. latis basi rotundatis lateralibus obliquis apice acutis cuspidatis, supra glabris vel consperse pilosis subtus adpresse pubescentibus, costa supra manifesta subtus prominula, venis primariis utrinsecus 4–5 supra manifestis subtus prominulis; inflorescentiis axillaribus paniculatis subcorymbosis, pedunculo ramis pedicellisque adpresse pubescentibus, pedunculo usque 2.5 cm. ramis 5 mm. pedicellisque \pm 1.5 cm. longis; calyce adpresse pubescente et pilis urentibus hispido, tubo 5 mm. longo late campanulato, lobo superiore 3 mm. longo emarginato, lateralibus 4 mm. longis acutis, infimo lineari-lanceolato 6–7 mm. longo acuminato; vexillo 1.5 cm. longo, alis 2 cm. longis, basim versus margine inferiore barbatis; carina 1.7 cm. longa abrupte apicem versus flexa; legumine ignoto.

BRITISH NEW GUINEA: Ononge Road, Dieni, *Brass 3901* (TYPE), April–May 1933, climbing on roadside regrowth bushes (leaves purple beneath; hairs on calyx brown; flowers cream-colored with a greenish tinge).

The short inflorescence suggests *Mucuna Lane-Poolei* Summerh., but the leaflets are not long caudate-acuminate. The flowers are a little smaller than those of *M. cyanosperma* K. Schum., but in that species the inflorescence has a peduncle 14–18 cm. long, and the leaves are much larger.

Mucuna brachycarpa Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien **89**: 562. 1913.

SOLOMON ISLANDS: Florida (N' Gela): northern end of island, *Brass 3514*, July 1933, alt. 75 m., hill rain-forests (climbing to tops of trees; dark glabrous leaves; calyx covered with brown hairs; corolla greenish, with numerous black specks and occasional blotches of red; only scanty fruiting material available).

In determining this collection we have the choice of assigning it to Rechinger's species or of describing it as new. The original description is wholly inadequate for determinative purposes; apparently the type consists of a stray 2-seeded *Mucuna* pod from Kieta, Bougainville; no dimension is indicated except that of the narrow wings. On account of geographic proximity and two almost unsupported fruit-characters (the scarcely prominent but obvious lamellae and the black seeds), we have assigned the collection to Rechinger's species and here append a brief description of our specimen:

Leaves \pm 15 cm. long; leaflets glabrous or sparsely hairy along the midrib beneath, 5–8 cm. long, 2.9–4 cm. broad, ovate-oblong, apex short and obtusely acuminate, base rounded, the lateral oblique, primary nerves 4 or 5 on either side of the midrib; petiole \pm 5 cm. long, rhachis 1.5 cm., petiolules 5–6 mm. long, stipels subulate; inflorescence apparently on older branches, paniculate, branches on the upper third or fourth of the greyish

pubescent axis, pedicels (1 cm. long) and ultimate branchlets atrofuscos velvety-pubescent; subtending bracts deciduous, broadly lanceolate, 2 cm. long, 0.6 cm. wide, atrofuscos velvety-pubescent; calyx velvety-pubescent with numerous rigid stramineous stinging hairs 2 mm. long, tube 5–6 mm. long, campanulate (in older flowers widely so), teeth triangular, the upper broad obtusish or slightly bilobed, the lateral and lower (4 mm. long) acute or acuminate; corolla 2.5 cm. long, standard 1.5 cm. long, 1 cm. broad, wings 5 mm. wide pubescent on the lower margin towards the base also in the region of the auricles, keel 2.5 cm. long abruptly bent about 1 cm. from the apex; pod (rather old and worn) 8–9 cm. long, scarcely 3 cm. wide, plaits distinct, seeds 3, black or mottled fuscous, \pm 1.5 cm. diameter, somewhat compressed, 1 cm. thick.

***Mucuna elegans* sp. nov.**

Scandens inflorescentiis foliisque novellis exceptis glaber; petiolo 11–13 cm. et rhachi 2.5–3 cm. petiolulisque 1 cm. longis; stipulis stipellis non visis; foliolis ellipticis vel ovato-ellipticis, 11–13 cm. longis, 6–7 cm. latis, basi subrotundatis vel rotundato-cuneatis lateralibus obliquis apice abrupte anguste acuminatis, acumine \pm 1 cm. longo basi 5 mm. lato, glabris vel novellis subtus consperse pilosis, nervis primariis utrinsecus 3–4 supra manifestis subtus prominulis, reticulo interdum manifesto; inflorescentiis subpaniculatis lateralibus solitariis vel subfasciculatis fere a basi ramosis, rhachi brevi \pm 2.5 cm. et ramis 3–5 mm. pedicellisque 3 cm. longis adpresse pubescentibus, calyce dense pubescente et pilis urentibus hispido, tubo 6 mm. longo late campanulato vel cupuliformi, lobo superiore fere nullo, lobis lateralibus 2 mm. longis acutis, lobo infimo 4–5 mm. longo lanceolato acuminato; petalis coccineis, vexillo 3.5 cm. longo, 2.5 cm. lato, alis 5.5 cm. longis basim versus margine inferiore barbatis, auriculis pubescentibus, carina \pm 6 cm. longa; legumine non viso.

SOLOMON ISLANDS: San Cristobal: Magoha River, *Brass* 2734 (TYPE), August 1932, littoral rain-forest, rare (magnificent climber displaying numerous festoons of large — about 6 cm. long — bright scarlet flowers in short clustered racemes below the pale green leaves).

The short inflorescence below the leaves suggests *Mucuna Bennettii* F. v. Muell., but the latter has prominent calyx-lobes. Another possible relative is *M. miniata* Merr. of Amboina. The latter has flowers very much like this species, but the wings are more pubescent, the rhachis of the inflorescence is much longer, the leaflets are slightly narrower, and the flowers appear before the leaves.

***Canavalia* De Candolle**

***Canavalia papuana* sp. nov.**

Scandens; ramulis glabris vel nodis parce pubescentibus; petiolo 4–10 cm. longo supra canaliculato, rhachi 2–4 cm. longa, petiolulis 3–5 mm. longis minute pubescentibus, stipulis stipellis caducis; foliolis membranaceis ovato-ellipticis 10–13 cm. longis, 5–8 cm. latis, lateralibus basi subrotundatis obliquis (foliolo terminali breviter cuneato-rotundato) apice acutiusculis vel breviter obtuseque acuminatis apiculatis glabris; costa nervisque primariis utrinsecus \pm 7 supra manifestis subtus prominulis, reticulo utrinque manifesto; inflorescentiis axillaribus racemosis 12–20-floris, pedunculo 10–14 cm. longo, rhachi subaequali puberula, nodis crassis,

pedicellis \pm 2 cm. longis; bracteolis non visis; calyce campanulato con-
 spersa breviter pubescente, tubo 5 mm. longo, lobo superno vix 3 mm. longo
 late rotundato emarginato, lobis inferis 3 brevibus triangularibus acutiuscu-
 lis; vexillo \pm 2 cm. longo unguiculato, ungui 5 mm. longo, alis circiter 2 cm.
 longis, 3-4 mm. latis, carina incurva obtusa; legumine minute pubescente
 oblongo \pm 8 cm. longo, 1.8-2 cm. lato, sutura dorsali tricarinata; seminibus
 5-6 immaturis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7730 (TYPE),
 September 1936, climbing over low second growths.

This species is unquestionably allied to *Canavalia luzonica* Piper, but
 the flowers are smaller and the pods are shorter, although those of the
 type are not yet mature. The two longitudinal ridges are very close to
 the dorsal suture.

DATISCACEAE

Tetrameles R. Brown

Tetrameles nudiflora R. Br. in Benn. Pl. Jav. Rar. 17, t. 17. 1838-1852; Koord. &
 Val. Mededeel. Lands Plant. 61: 37 (Bijdr. Boomsort. Jav. 9: 37). 1903; Atl.
 Baumart. Jav. 1: f. 71. 1913.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass*
 8240, November 1936, rain-forest, plentiful on the drier ridges (very large deciduous
 tree; stem heavily buttressed and producing large spreading surface roots; bark very
 thick, smooth, grey, lenticellate; flowers green; leaves not seen). India to the Celebes.

This collection consists only of staminate panicles, but the flowers are
 a good match for the δ material of this species in our herbarium, and
 the description of the tree corresponds so well with that of the original
 that we believe the collection must belong to *Tetrameles nudiflora* R. Br.,
 representing a genus not previously reported for New Guinea.

HALORAGACEAE

Haloragis J. R. & G. Forster

Haloragis chinensis (Lour.) Merr. Trans. Amer. Philos. Soc. II. 24(2): 290. 1935.

Gaura chinensis Lour. Fl. Cochinch. 225. 1790.

Goniocarpus scaber Koenig in Koenig & Sims Ann. Bot. 1: 547, t. 12, f. 6. 1805.

Haloragis scabra Benth. Fl. Hongk. 139. 1861.

Haloragis scabra var. *elongata* Schindler, Pflanzenr. 23(IV. 225): 29. 1905.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11629, December 1938, alt. 1600 m.,
 deforested slopes, common on sandy soil (flowers red). BRITISH NEW GUINEA: Oriomo
 River, Wuroi, *Brass* 5855, January-March 1934, alt. 20 m., a few plants in a small tea-
 tree marsh on savanna (weak ascending scabrous herb).

This material, here recorded to call attention to the older specific name,
 agrees very well with the Chinese collections of this species.

Haloragis acanthocarpa Brongn. in Duperrey, Voy. t. 70. 1828; Benth. Fl. Austr. 2:
 483. 1864; F. M. Bail. Queensl. Fl. 2: 555. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8669, January 1937,
 poorly drained savanna forest, commonly surrounding termite mounds.

The fruit agrees better with the description of *Haloragis leptotheca*
 F. v. Muell. than with that of *H. acanthocarpa* Brongn.; however, since
 the two are accepted as synonymous, we see no reason for excluding the

collection from this species. The fruit, apart from the calyx-lobes crowning it, is narrowly oblong, 1.2 mm. long, 0.8 mm. broad, 8-ribbed, with 3 or 4 minute tubercles in a single row between each pair of ribs.

Haloragis nemorosa F. W. Went, Nov. Guin. 14: 107, t. 11B. 1924.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11672, December 1938, alt. 1700 m., common on grassy banks of stream (slender, erect or shortly scrambling shrub 1 m. or more high; flowers red).

This collection is a close match for the plate of this species. It differs in the following points from the original description: stem terete, subtomentose, angular only on the upper part; leaves scabrous above, beneath the hairs very short and minutely bulbous at the base (cf. Went's description of the upper surface of the leaves of *H. fruticosa*), trichomes longer and more crowded on the midrib; calyx-tube in younger leaves \pm pubescent, in the older ones tending to have only the veins pubescent. This is mainly a difference in the amount of pubescence, and possibly in the quality, although allowance must be made for individual differences in definition; such differences could hardly be considered of specific value without a comparison with the actual type.

LOGANIACEAE

Geniostoma J. R. & G. Forster

Geniostoma Archboldianum sp. nov.

Arbuscula 2.5–7 m. alta; ramulis tetragonis 4-lineatis, novellis nigrescentibus dense puberulis demum glabris; foliis coriaceis opacis in sicco nigrescentibus ellipticis 1.8–4 cm. longis, 1–2.2 cm. latis, apice acutiusculis vel obtusiusculis basi breviter late cuneatis, costa supra subplana vel elevata subtus prominula, nervis primariis utrinsecus \pm 6 patentiadscendentibus marginem versus arcuatis supra subobscuris subtus perspicue manifestis non elevatis, venulis indistinctis; stipulis novellis late ovatis cito marcescentibus vel deciduis; petiolo circiter 5 mm. longo glabro; floribus in foliorum axillis in cymis paucifloris circiter 5 mm., in fructu usque 10 mm. longas dispositis; pedicellis basim versus bracteatis; sepalis ovatis acutis 1 mm. longis basim versus connatis; corollae tubo circiter 1.5 mm. longo intus fere glabro (trichomis paucis prope filamenta), lobis 1–1.5 mm. longis intus glabris vel minutissime papillois; filamentis vix 0.5 mm. longis minute pilosis, antheris ovatis cordatis 1 mm. longis apice connectivo manifeste apiculatis, utrinque \pm breviter pilosis; ovario depresso subgloboso 1 mm. longo, 1.5 mm. lato, glabro, stylo 0.4 mm. longo minute pubescente, stigmatibus globosis pubescentibus; fructibus ovoideis 5 mm. longis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11362 (TYPE), November 1938, alt. 2200 m., rain-forest, on bank of river (weak-tree 2.5 m. high; leaves dark green; flowers white; green dehiscent fruits with red seeds); same locality, *Brass* 11533, alt. 2400 m., forest substage (tree 7 m. high; flowers white); Balim River, *Brass* 11750, December 1938, alt. 1800 m., grassy long deforested slopes (small bushy tree; flowers white).

The distinctive floral characters are the size of the flower, the practically glabrous corolla, the pubescent and manifestly apiculate anthers. The latter character suggests an alliance with *Geniostoma antherotrichum* Gilg & Benedict, but the latter has much larger leaves and larger much more

elaborately branched inflorescences. In *G. Archboldianum* the veins of the corolla lobes are usually 3 or 5, the laterals running off from the midrib near the base and sometimes branching again near the tip. The species, in several characters, suggests *G. Pullei* Cammerl. but the leaves are shorter in proportion to the width and not acuminate, the pedicels are glabrous, the filaments are short, and the stigma is globose.

Geniostoma Gilgii nom. nov.

Geniostoma stenophyllum Gilg. & Benedict, Bot. Jahrb. **54**: 162. 1916, non Merr. (1912).

The species is not represented in our material.

Geniostoma Brassii sp. nov.

Arbuscula vel frutex glaber; ramis cinereis, ramulis brunnescentibus cito cinerascentibus compressis; foliis coriaceis in sicco atrofusci lanceolatis 6–9 cm. longis, 1.5–2.5 cm. latis, apice acuminatis basi anguste rotundatis vel late ac breviter cuneatis, costa supra impressa subtus prominente, nervis primariis utrinsecus ± 7 arcuatim adscendentibus supra interdum impressis subtus \pm prominulis, reticulo obscuro; petiolo circiter 1 cm. longo; floribus in foliorum axillis in cymas 5–7-floras compactas circiter 1 cm. longas confertis; pedicellis ± 1.5 cm. longis; bracteis parvis; sepalis vix 2 mm. longis ovatis obtusis; corollae tubo 3 mm. longo intus faucem versus et ad faucem dense longiuscule piloso, lobis anguste ovatis 2.5 mm. longis obtusiusculis basim versus pilosis; filamentis brevissimis, antheris oblongo-ovatis 1.2–1.4 mm. longis apice minute apiculatis glabris; ovario subgloboso glabro, 1 mm. longo, stylo glabro 1 mm. longo, stigmatе crasse clavato; fructibus ovoideis 8 mm. longis 5 mm. diametro.

SOLOMON ISLANDS: San Cristobal: Hinuahaoro, Brass 3024 (TYPE), September 1932, alt. 900 m., common in mountain rain-forests (slender virgate tree or small shrub).

A species superficially somewhat resembling *Geniostoma Cumingianum* Benth. of the Philippines and *G. rupestre* Forst. of Polynesia. It differs from both in the stiff (when dry) coriaceous leaves and the clavate stigma. The lateral veins of the lobes of the corolla arise with the midrib at the base of the tube and branch dichotomously, the point of branching is concealed beneath the pilosity in the throat of the tube and the base of the corolla lobes.

Geniostoma Randianum sp. nov.

Arbuscula vel frutex 2–4 m. altus glaber; ramulis tetragonis novellis brunnescentibus demum cinereis; foliis coriaceis in sicco atro-viridescenscentibus subtus pallidioribus, oblongis 2.5–4 cm. longis, 0.8–2 cm. latis, utrinque aequaliter angustatis apice apiculatis, apiculo interdum \pm pubescente, costa supra plana vel leviter elevata subtus prominente, nervis primariis utrinsecus ± 6 patenti-adscendentibus marginem versus arcuatis supra insculptis subtus prominulis, reticulo utrinque manifesto; stipulis triangularibus apiculatis; petiolo circiter 5 mm. longo basi bulboso; floribus in foliorum axillis solitariis vel in cymis depauperatis dispositis; sepalis 1.5 mm. longis ovatis acutis basim versus connatis; corollae tubo 4 mm. longis extus glabro intus faucem versus consperse breviter piloso, lobis ovatis 3 mm. longis acutiusculis glabris; filamentis vix 1 mm. longis pilosis, antheris

ovatis apice connectivo minute apiculatis breviter pilosis; ovario globoso 2 mm. diametro, stylo 2 mm. longo glabro, stigmatibus pubescentibus; fructibus in specimine typico immaturis oblongo-ovoideis 1.4 mm. longis.

BRITISH NEW GUINEA: Wharton Range, Murray Pass, *Brass* 4522 (TYPE), June–September 1933, alt. 2840 m., common in forest fringes (small tree or large bush 2–4 m. tall; leaves thick, shining, yellowish beneath; flowers green; fruit dark green).

Only in the pilose anthers the species shows a similarity to *Geniostoma antherotrichum* Gilg & Benedict. Its best characters are the 4-angled branchlets, the small oblong leaves, the relatively large flowers with pilose anthers, and the fairly large fruit. The lateral veins of the corolla lobes are usually twice dichotomously branched.

***Geniostoma obtusum* sp. nov.**

Frutex circiter 2 m. altus glaberrimus; ramulis tetragonis 4-lineatis novellis brunnescentibus cito cinereis; foliis coriaceis opacis supra rugosis in sicco nigrescentibus subtus pallidioribus obovato-ellipticis 2.5–5 cm. longis, 1.5–2.8 cm. latis apice rotundatis saepe minute apiculatis basi cuneatis, costa utrinque \pm elevata, nervis primariis utrinsecus \pm 6 arcuato-adscententibus supra insculptis subtus prominulis, reticulo laxo supra impresso subtus manifeste vix prominulo; stipulis triangularibus apice acutis; petiolo 5–8 mm. longo basi bulboso; floribus in foliorum axillis solitariis vel binis pseudofasciculatis; pedicellis basim versus bracteatis; sepalis late ovatis acutiusculis 1.5 mm. longis in parte $\frac{1}{4}$ inferiore connatis; corollae tubo campanulato extus glabro intus faucem versus breviter piloso 4 mm. longo, lobis 3 mm. longis ovatis acutiusculis basi pilosis; staminibus ad faucem insertis, filamentis subnullis, antheris ovato-ellipticis 1.5 mm. longis apice connectivo manifeste appendiculatis breviter pilosis; ovario globoso glabro, stylo 2 mm. longo glabro, stigmatibus subgloboso parce pubescentibus vel fere glabro; valvis fructus 2 cm. longis 1 cm. latis.

BRITISH NEW GUINEA: Mount Tafa, *Brass* 4995 (TYPE), May–September 1933, alt. 2400 m., debris of an old landslide (bush about 2 m. tall; flowers pale green; dark green fruit).

This species is closely related to *Geniostoma Randianum* Merr. & Perry. It differs chiefly in the obovate leaves. There is a slight difference in the pubescence in the throat of the corolla, and the stigma is practically glabrous.

***Mitrasacme* Labillardière**

***Mitrasacme alsinoides* R. Br. Prodr. 453. 1810.**

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7826, September 1936, plentiful on wet grass plains (flowers white).

Apparently this is a new record for New Guinea, although the plant has been reported from Australia and also from Malaysia. This species-name and *M. indica* Wight have been considered synonyms by some authors. We have not material available to settle the question. In this material the throat is shortly bearded, a character not mentioned in the original description.

***Couthovia* A. Gray**

***Couthovia novo-britannica* Kaneh. & Hatus. Bot. Mag. Tokyo 53: 9. 1939.**

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski* 1679, April

1930, alt. 950 m., rain-forest; Koniguru, Buin, *Kajewski* 2010, August 1930, alt. 800 m., rain-forest (tree up to 20 m. high, fruit white). Ysabel: Tiratona, *Brass* 3408, December 1932, alt. 600 m., rain-forest (small tree with brown slightly flaky bark). Gaudal canal: Uulolo, Tutuve Mountain, *Kajewski* 2548, April 1931, alt. 1200 m., rain-forest.

Although, in the original description, the tube of the corolla below the throat is described as glabrous within, we find in the buds of a co-type that there are small fascicles of hairs between the short filaments and that very few, if any, hairs are attached to the base of the anthers. That is, according to our interpretation, the anthers are glabrous or practically so. These characters hold in the specimens cited above, and with the material at hand we are unable to distinguish them from *Kanehira* and *Hatusima*'s species. Without examination of the type of *Couthovia brachyura* Gilg & Benedict, we are not in a position either to confirm or to deny the inference in the discussion of *C. novo-britannica* Kaneh. & Hatus. that *C. Brassii* S. Moore is most probably identical with *C. brachyura* Gilg. & Bened. We would suggest, however, that the isotype of *C. Brassii* S. Moore does not correspond with the original description of Gilg & Benedict's species.

***Couthovia macrophylla* sp. nov.**

Arbor usque 20 m. alta; ramulis angulatis levibus; foliis chartaceis petiolatis, petiolo 1.5–2.5 cm. longo, stipulis interpetiolaribus usque $\frac{1}{2}$ petiolo adnatis chartaceis vel subcoriaceis profunde fissis 0.7–2 cm. longis partibus triangularibus acutis persistentibus; lamina elliptica vel subrotundata, 18–27 cm. longa et 12–24 cm. lata, apice rotundata basi rotundata deinde abrupte breviter cuneata, costa supra canaliculata subtus prominente, nervis lateralibus utrinsecus 10–12 patenti-adscentibus utrinque prominulis, venis laxe reticulatis; floribus in apice ramorum in subcorymbum multiflorum cymosum confertis, cymis circiter 4-plo divisus, pedunculis 12–14 cm. longis, ramis primariis \pm 8 cm. longis secundariis atque tertiariis valde diminutis omnibus dense minuteque pubescentibus; pedicellis brevissimis; sepalis rotundatis pubescentibus ciliatis basi in brevem tubum connatis: corolla extus puberula, tubo cylindraceo 3 mm. longo, intus in parte intermedia inter antheras dense fasciculatim piloso, lobis ovatis acutis 1.5 mm. longis, fauce densissime pilosa; staminibus in parte $\frac{1}{3}$ inferiore insertis, filamentis 1.5 mm. longis, antheris anguste ovatis 1.5 mm. longis glabris; ovario ovoideo sursum in stylum attenuato capitato; fructu elongate conico 2 cm. longo 1 cm. diametro deinde in stipitem \pm 7 mm. longum 4 mm. latum abrupte constricto.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5815, common on banks of tidal backwater river (large bush or small open tree; fruit fibrous, orange-red); Lower Fly River, east bank opposite Sturt Island, *Brass* 8007 (TYPE), October 1936, abundant in poorly developed forest on some flood-plains (tree with small crown and pale fibrous flaky bark, attaining 20 m.; stem flanged or fluted; leaf-nerves pale; flowers white).

This species shows considerable likeness to *Couthovia celebica* Koord. In that, however, the corolla tube, except the villous throat, is described as glabrous within, although the plate, Suppl. 1, Fl. N. O. Celebes, t.2. 1918, would seem to indicate that the corolla is pubescent between the bases of the filaments as it is in our species. Unfortunately, in the two

collections we have from the Celebes the flowers are only in young bud. The fruit of the New Guinean material is much more elongate than that in the Philippine collections of *C. celebica* Koord. Until much more material is available to show variations we think it preferable to regard these as two distinct but closely related species.

***Couthovia leucocarpa* sp. nov.**

Arbor 23–41 m. alta; ramulis subteretibus fuscis levibus; foliis subcoriaceis petiolatis, petiolo 1–1.5(–2) cm. longo, stipulis interpetiolaribus obovoideis obtusis plerumque longitudinaliter profunde fissis; lamina elliptica, 7–13 cm. longa et 4–8 cm. lata, utrinque angustata apice obtusiuscula vel interdum rotundata basi breviter cuneata, costa supra subplana subtus prominente, nervis lateralibus utrinsecus \pm 5 utrinque prominulis subadscententibus, venis laxe reticulatis obscuris; floribus in apice ramorum in corymbum multiflorum densum confertis, pedunculis 1–1.5 cm. longis cymae ramis primariis 3–4 cm. longis secundariis atque tertiariis valde diminutis consperse puberulis; pedicellis nullis vel subnullis; bracteis minimis puberulis; sepalis 2 mm. longis suborbicularibus margine ciliolatis; corollae tubo cylindraco 3 mm. longo, lobis ovatis acutis 1 mm. longis, fauce dense pilosa, tubo ceterum intus glabro vel in parte intermedia inter antheras parce pubescente; staminibus in medio tubo insertis, filamentis brevissimis, antheris anguste ovatis basi manifeste barbatis, ovario ovoideo sursum in stylum tenue attenuato, stigmatibus capitato; fructu figura triangulo-ovoideo 1.5 cm. longo, 1.8 cm. lato, basi in stipitem obconicum 0.7 cm. longum totidem latum abrupte constricto.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13116* (TYPE), March 1939, alt. 850 m., occasional in rain-forest of plain (tree 23 m. high, 40 cm. diameter; flowers white; ripe fruit white); 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13517*, March 1939, alt. 750 m. (tree 41 m. high, 72 cm. diameter; flowers white, ripe fruit white); Bernhard Camp, Idenburg River, *Brass & Versteegh 13593*, April 1939, alt. 350 m. (tree 31 m. high, 66 cm. diameter; fruits green).

This species suggests *Couthovia terminalioides* Gilg & Bened. in floral characters, but the latter has rather larger leaves and fruit gradually long-attenuate at the apex.

***Fagraea* Thunberg**

***Fagraea Archboldiana* sp. nov.**

Arbor 5 m. alta; ramulis novellis viridescentibus demum pallide cinereis; foliis petiolatis, petiolo 1.5–2 cm. longo, basi stipulis in laminulam intra-petiolarem retusam pulviniformem connatis aucto; lamina 9–14 cm. longa, 3–5 cm. lata, obovato-oblonga vel oblanceolata basi longe cuneata apice subabrupte acuta vel breviter acuminata, costa basim versus laminae utrinque prominente, nervis lateralibus utrinsecus \pm 6 obscuris; inflorescentiis 3- vel 5-floris; bracteis infimis foliiformibus, pedunculis vel pedicellis 1–2.5 cm. longis; bracteolis 2 ovatis obtusis circiter 2 cm. longis basi connatis coriaceis margine membranaceis concavis lateraliter compressiusculis; calycis tubo 1 cm. longo, lobis 1.5–2 cm. longis rotundatis margine membranaceis; corollae tubo 3.5–4 cm. longo infundibuliformi intus calycem circiter 1 cm. sub lobis 2–2.5 cm. diametro, lobis late rotundatis 1.5 cm. longis, 1.8 cm. latis; staminibus circiter in tubo medio insertis; fila-

mentis \pm 1.5 cm. longis, antheris 1 cm. longis, 4 mm. latis; stylo 3.5 cm. longo, stigmata suborbiculari; fructibus obovoideis immaturis in sicco 3 cm. longis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11343 (TYPE), November 1938, alt. 2300 m., Fagaceae forests, occasional in seral growths of forest openings (tree 5 m. high; flowers greenish yellow).

As far as we know, this is the only *Fagraea* as yet described from New Guinea with large coriaceous bracts embracing the base of the calyx. In some respects it suggests *F. obovata* Wall. but, in the collections at hand, that species has much smaller bracts and these do not particularly cover the base of the calyx. Two specimens from the Philippines, *Ramos* 30451, Cantanduanes, and *Wenzel* 936, Leyte, have these large bracts enclosing the lower part of the calyx and may be conspecific with our species.

Fagraea Cambagei Domin, Bibl. Bot. 22 (Heft 896): 1071. 1928.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7454, August 1936, common in bushy type of rain-forest (tree 10–12 m. tall; branches flat spreading; bark brown, hard, deeply furrowed and fissured; flowers cream; fruit white); Lower Fly River, east bank opposite Sturt Island, *Brass* 8097, October 1936, rain-forest, common on dry ridges (brushy substage tree 6–7 m. tall; flowers pale yellow; fruit smooth, white, up to \pm 2.5 cm. diameter).

Although in these collections the inflorescence is terminal rather than lateral as given in the original description, the material is a fairly good match for collections so named from Queensland. It is certainly too close to the original description to be considered distinct without comparison with the actual type. The fruit is ovoid and shortly apiculate.

Fagraea elata sp. nov.

Arbor \pm 28 m. alta; ramulis brunnescentibus; foliis coriaceis petiolatis, petiolo 2 cm. longo supra plano, basi stipulis in laminulam intrapetiolarem obtusam vix 5 mm. longam connatis aucto; lamina elliptica 8–13 cm. longa, 4–6.5 cm. lata, apice rotundata deinde abrupte brevissime (3–5 mm.) obtuse acuminata basi rotundato-cuneata, costa supra impressa subtus prominente, nervis lateralibus utrinsecus 6–8 supra insculptis subtus manifestis; floribus in apice ramorum in cymis paucifloris dispositis, cymae ramis \pm 1 cm. longis; bracteis infimis foliiformibus circiter 2 cm. longis, 7 mm. latis, ceteris squamiformibus oblongis 3–4 mm. longis, rotundatis leviter compressis; pedicellis vix 1 cm. longis; floribus in alabastris tantum visis; calycis tubo vix 5 mm. longo, lobis circiter 6 mm. longis latisque rotundatis; corollae tubo immaturo; staminibus circiter in medio tubo insertis; fructibus vix maturis 3 cm. longis rostrum 1 cm. longum, 1.7 cm. diametro, includentibus, obovoideis apice subabrupte longe rostratis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11975 (TYPE), January 1939, alt. 1530 m., rare on slopes of primary forest (tree 28 m. high, 36 cm. diameter; flower-buds green; fruit green); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12533, February 1939, alt. 1200 m., frequent on slopes of primary forest (tree 29 m. high, 58 cm. diameter; flower-buds green; fruits orange-colored).

In the obvious primary veins of the leaves the species suggests *Fagraea dolichopoda* Gilg & Bened. The leaves of the latter, however, are very different in outline, being manifestly acuminate at the apex and narrowly

cuneate at the base. The fruits, too, are different. Closely allied and possibly belonging to this species is *Brass* 1418, Aisa River, Eastern Division, British New Guinea.

***Fagraea Bodenii* Wernh.** Trans. Linn. Soc. Bot. II. 9: 111. 1916.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh* 10453, *Brass* 10541, alt. 2800 m.; Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh* 11113, alt. 2240 m.; Balim River, *Brass & Versteegh* 11191, alt. 2160 m.; 15 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12133, alt. 1800 m.; 6 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12744, alt. 1500 m. (epiphytic tree 6 m. high; flowers cream-colored; fruits orange).

These collections are relatively uniform. Frequent or occasional in mossy forest, a tree 15–20 m. high with white or cream-colored fragrant flowers and orange-colored fruits. The type should be compared with the original of *Fagraea suaveolens* Cammerl. The latter has slightly larger flowers than those in the collections cited; there is, nevertheless, a strong resemblance in the two descriptions. Wernham does not give the size of the flower in his species. Either identical or very closely related is: *Brass* 4084, alt. 2350 m., Mount Tafa, British New Guinea. Here the corolla tube is more campanulate than infundibular.

***Fagraea papuana* sp. nov.**

Arbor epiphytica circiter 10 m. alta; ramulis \pm angulatis cinereis vel pallide brunnescentibus; foliis petiolatis, petiolo 1–2 cm. longo stipulis in laminulam intrapetiolaem obtusam 5–7 mm. longam connatis aucto; lamina obovato-oblonga 6–11 cm. longa, 3–5 cm. lata, apice abrupte obtuse breviter acuminata basi sensim cuneata, costa utrinque distincta, nervis lateralibus utrinsecus circiter 8–10 obscuris; floribus in apice ramorum in cymam plurifloram 2-plo divisam dispositis, cymae ramis 1–1.5 cm. longis; pedicellis \pm 5 mm. longis; bracteis infimis circiter 2.5 cm. longis foliiformibus vix 5 mm. petiolatis, ceteris squamiformibus ovatis rotundatis 3–4 mm. longis; calyce circiter 6 mm. longo, lobis rotundatis 3 mm. longis; corollae tubo 2 cm. longo infundibulari supra calycem 3–4 mm. sub apice 5–7 mm. diametro, lobis late oblongis 1.5 cm. longis, 1 cm. latis; staminibus circiter 8 mm. supra basim corollae tubi insertis, filamentis \pm 5 mm. longis, antheris 1 cm. longis; stylo incluso, stigmatibus bilobis; fructibus immaturis 2 cm. longis, 1 cm. latis, obovoideis apice breviter rostratis.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass* 6749 (TYPE), May 1936, alt. 80 m., ridge-forest (epiphyte in top of a canopy tree, \pm 10 m. high; leaves somewhat fleshy with recurved tips; flowers cream-colored, fragrant).

This species suggests two species already described, *Fagraea calophylloides* Gilg & Bened. and *F. Bodenii* Wernh. The first has leaves with numerous or very numerous primary veins and, according to fig. 11 accompanying the original description, stamens inserted above the middle of the corolla tube. In our species the leaves show 8–10 pairs of primary veins in transmitted light, otherwise it is difficult to count them; the stamens are inserted on the lower 1/3 of the corolla tube. In *F. Bodenii* Wernh. the fruit is long-rostrate and the filaments are about twice as long as in *F. papuana*.

***Fagraea obtusifolia* sp. nov.**

Arbor 20–30 m. alta; ramulis cinereis internodiis brevissimis; foliis coriaceis petiolatis; petiolo 2–3.5 cm. longo supra subplano basi dilatato; lamina suborbiculari vel late elliptica 6.5–12 cm. longa, 4–10 cm. lata, apice rotundata basi rotundata deinde abrupte cuneata, costa supra impressa subtus subprominente, nervis lateralibus utrinsecus 4–6 supra leviter insculptis subtus prominulis; inflorescentiis cymosis 2-plo divisis in fructu \pm 3.5 cm. longis terminalibus atque in axillis foliorum superiorum; ramis cymae \pm 5 mm. longis; floribus non visis; pedicellis 1–1.5 cm. longis basi bibracteatis, bracteis ovatis obtusis circiter 2 mm. longis; calycis tubo brevissimo, lobis subrotundatis patentibus 4–5 mm. longis latisque margine membranaceis; fructibus oblongis breviter apiculatis 1.5 cm. longis, 1 cm. diametro.

SOLOMON ISLANDS: *Ysabel*: Tataba, *Brass* 3444 (TYPE), January 1933, alt. 50 m., rain-forest ridges, common (handsome tree with spreading crown, 20–30 m. tall; thick rough rather fibrous bark and hard brown wood; very thick concave leaves yellow-green beneath; very smooth pale brown soft fleshy fruit).

We are unable to suggest a closely allied species. The almost orbicular long-petioled leaves, the short branches of the inflorescence, the long pedicels, the short inconspicuous calyx-tube, and the spreading lobes are the best characters of this rather distinctive species.

Fagraea aurantiodora S. Moore, Jour. Bot. **66**: 105. 1928; C. T. White, Jour. Arnold Arb. **10**: 259. 1929.

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13472, March 1939, alt. 800 m., rain-forest (subsidiary tree 25 cm. diameter; flowers white; fruits orange).

This is a new record for Netherlands New Guinea. The species belongs to the subgenus *Cyrtophyllum* along with *F. elliptica* Roxb., *F. sumatrana* Miq., *F. fragrans* Roxb., and *F. sororia* J. J. Sm. The dried fruit is subglobose and about 4 mm. in diameter.

Fagraea salomonensis Gilg & Benedict, Bot. Jahrb. **56**: 554. 1921.

SOLOMON ISLANDS: *Bougainville*: Kupei Gold Field, *Kajewski* 1688, April 1930, alt. 1000 m.; Koniguru, Buin, *Kajewski* 2041, August 1930, alt. 950 m. *Gudalcanal*: Uulolo, Tutuve Mountain, *Kajewski* 2522, April 1931, alt. 1200 m.; Sorvorhio Basin, *Kajewski* 2708, January 1930, alt. 150 m. *San Cristobal*: Hinuahaoro, *Brass* 2915, September 1932, alt. 900 m. *Ysabel*: Tiratona, *Brass* 3212, November 1932, alt. 600 m. Rain-forest. Tree sometimes epiphytic, sometimes terrestrial, with pale yellow heavily scented flowers and yellow or orange-colored subglobose and shortly apiculate fruit \pm 3.6 cm. long and 3 cm. diameter. Natives use fruit as a fly-trap, first removing the epicarp to expose the viscid mesocarp.

These collections agree reasonably well with the original description of *Fagraea salomonensis* Gilg & Bened. One of the *Brass* collections is in flower, the dimensions being only very little smaller than those of the original. The inflorescence is about 10 cm. long, subtended at the base by leaves and at the nodes by oblong or ovate obtuse bracts 8–4 mm. long; the stamens are inserted a little above the middle of the corolla-tube, and the anthers are linear, 1 cm. long, exerted at the tips only.

***Neuburgia* Blume**

Although none of our material falls into *Neuburgia* Bl., to aid the next

worker to find the genus more easily, we here append this short note. Markgraf in "Die Apocynaceen von Neu-Guinea," Bot. Jahrb. 61: 222. 1927, transferred the genus from the Apocynaceae to the Loganiaceae. In a brief comment, he indicated that *Neuburgia tubiflora* Bl. is identical with *Crateriphytum moluccanum* Scheff., and that Blume's name is the older, hence valid. The type of the genus is *N. tubiflora* Bl. As for the other species included in the genus, *N. musculiformis* (Lam.) Miq. (*N. tuberculata* Bl.), we are uncertain as to its identity, but from Rumphius's description and plate, we are confident it does not belong to the genus *Neuburgia* Bl.

RUBIACEAE

Mastixiodendron Melchior

Mastixiodendron pachyclados (K. Schum.) Melchior, Bot. Jahrb. 60: 168, t. 1. 1925; C. T. White, Jour. Arnold Arb. 10: 257. 1929.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh 13548*, April 1939, alt. 120 m., occasional in primary forest, on slope of ridge (tree 31 m. high, 45 cm. diameter; bark black, scaly; fruit green); same locality, *Brass 14097*, April 1939, alt. 50 m., rain-forest of river plains, subject to occasional inundations, sometimes in almost pure stands \pm 30 m. high but of limited extent; stem with small plank-buttresses; bark brown, lenticellate; wood yellowish; leaf-margins recurved below the middle; flowers green; fruit unripe).

In the sight determinations, these collections were placed in the Loganiaceae, probably on account of the pubescence or long yellow papillae on the inside of the corolla-lobes. However, on working over the Loganiaceae, we find the material undoubtedly belongs to *Mastixiodendron* Meich., established as a genus of the Cornaceae. This we sent to Dr. I. W. Bailey for a check. He replied, "Although Melchior studied the structure of the leaves and stem, he failed to recognize that the structure of these organs excludes the plant from the Cornaceae. *Mastixiodendron* is clearly rubiaceous." The genus is very closely related to *Dorisia* Gillespie in Hook. Ic. Pl. 32: t. 3190. 1933, first placed in the Cornaceae, but later removed to the Rubiaceae by Dr. A. C. Smith; for discussion, see Bishop Mus. Bull. 141: 140, 141. 1936.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

STUDIES OF PAPUASIAN PLANTS, V*

A. C. SMITH

THE present paper primarily contains a discussion of the Winteraceae of New Guinea and the Solomon Islands, while brief notes on two genera of Magnoliaceae and two genera of Monimiaceae (supplementary to the treatment in Jour. Arnold Arb. **22**: 231–252. 1941) are added. When no place of deposit is cited for specimens, they have been seen only in the herbarium of the Arnold Arboretum; otherwise the place of deposit is indicated by: (A) Arnold Arboretum, (NY) New York Botanical Garden.

WINTERACEAE

The Winteraceae is now usually accepted as distinct from the Magnoliaceae, with which earlier taxonomists combined it. Morphological and anatomical studies show that the two families are entirely distinct. Prof. I. W. Bailey has for many years been assembling data on the inter-relationships of the families of woody Ranales, and papers discussing some of these families are now in preparation. Many botanists who have worked with the winteraceous genera have declined to accept the pioneer work of van Tieghem (in Jour. de Bot. **14**: 275–297, 330–355. 1900), who defined the family as consisting of six genera, excluding *Illicium* L. Hutchinson (in Kew Bull. **1921**: 185–191. 1921), in discussing the Winteraceae, included *Illicium* but otherwise accepted van Tieghem's delimitations. Our preliminary studies convince us that most, if not all, of van Tieghem's genera are well-founded. An amplification of the relationships of these genera is being prepared, and the purpose of the present treatment is to record the novelties which have been discovered in Papuasias by recent collectors. In our region three genera of the Winteraceae occur, *Drimys* and *Bubbia* in New Guinea and *Belliolum* in the Solomon Islands.

DRIMYS J. R. & G. Forst.

In the only comprehensive work on this group of plants in New Guinea, Diels (in Bot. Jahrb. **54**: 240–245. 1916) used the name *Drimys* in its broader sense, to include species of *Bubbia*. He recognized six species of *Drimys* proper from New Guinea. In the same year, Ridley (in Trans. Linn. Soc. II. Bot. **9**: 11–13. 1916) proposed eight species of *Drimys*, of which all except one fall into the narrower concept of the genus. More recently, Pulle, Diels, and Gibbs have each described additional species, and at the present time 23 names of New Guinean species have been proposed which are referable to *Drimys* in the restricted sense (excluding *Bubbia*). Examination of the descriptions of these species indicates that

* Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **22**: 497–528. 1941.

most of them are very distinct. The rapid growth of the number of species of *Drimys* recognized from New Guinea is due entirely to recent explorations in the higher mountains, and I am convinced that reductions to synonymy will not be extensive, although of course some changes in the nomenclatural status of various entities will be inevitable as our knowledge of the region increases. The collections now under study make necessary the description of six new species, all obtained by Mr. L. J. Brass.

***Drimys microphylla* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) epiphyticus multiramis 1–2 m. altus ubique glaber, ramulis gracilibus apicem versus leviter angulatis demum subteretibus et cinereis; foliorum parvorum petiolis gracilibus 1–2 mm. longis, laminis subcoriaceis in sicco fuscis elliptico-obovatis, (5–)6–10 mm. longis, (2–)3–5 mm. latis, basi gradatim angustatis, apice rotundatis, margine leviter recurvatis, costa supra subplana vel leviter impressa subtus elevata, nervis lateralibus ut videtur utrinsecus 3 vel 4 obscuris immersis; floribus ♂ axillaribus apicem ramulorum versus solitariis, pedicellis gracilibus sub anthesi 4–6 mm. longis; sepalis 2 calypratis membranaceis obscure pellucido-glandulosis circiter 2 mm. longis mox caducis; petalis 4–6 submembranaceis lineari-oblongis vel anguste obovatis, 4–5 mm. longis, 0.8–1.2 mm. latis, apice obtusis vel subacutis; staminibus 14–18 toro parvo subconico congestis et plerumque 3-seriatis, 1–2 mm. longis (exterioribus quam interioribus conspicue brevioribus), filamentis basi et apice leviter contractis, apicem versus obscure glandulosis, loculis oblique terminalibus circiter 0.35 mm. longis longitudinaliter dehiscentibus; carpellis sterilibus plerumque solitariis raro 2 interdum nullis, quam staminibus brevioribus, ellipsoideis, compressis; fructu maturitate unicarpellato subcarnoso ellipsoideo, circiter 6 mm. longo et 3 mm. lato, basi obtuso, apice obscure uncinato, carina stigmatum obscura, pericarpio copiose glanduloso, seminibus plerumque 3 pendulis obovoideis nigris levibus nitidis, circiter 4 mm. longis et 1.5 mm. latis, apice rotundatis, basi angustatis, leviter angulatis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, alt. 1800 m., *Brass 12006* (TYPE), Jan. 1939 (much-branched shrub 1–2 m. high, very abundant as an epiphyte on high trees in mossy-forest; flowers white).

This species is suggestive only of *D. vaccinioides* Ridley, than which it has slightly larger leaves and flowers and more numerous petals (4–6 rather than 2) and stamens (14–18 rather than about 8). There are some discrepancies between the description of *D. vaccinioides* (in *Trans. Linn. Soc. II. Bot.* 9: 13, 1916) and the illustration (l. c. *pl.* 1, *f.* 1–6). Thus, while the text describes the leaves as 5 mm. long and with 2 pairs of nerves, the plate shows them up to 7 mm. long and with about 4 pairs of nerves; the flowers are said to be 2 mm. broad, but the plate shows petals 3 mm. long. The stamens are apparently 1- or 2-seriate and the torus is more flattened than that of *D. microphylla*; *f.* 5 indicates that 2 carpels are sometimes present in the flowers of *D. vaccinioides*.

I have seen only staminate flowers of *D. microphylla*, although many were dissected; it is possible that pistillate flowers will prove to have fewer stamens. Most of Brass' specimens were taken from a staminate plant, but there are a few branchlets with fruits, apparently taken from a differ-

ent plant. The greatly reduced number of seeds, their strictly apical attachment, and their proportionately large size are noteworthy characters in *D. microphylla*; the fruits of *D. vaccinioides* have not yet been described.

Drimys buxifolia Ridley in Trans. Linn. Soc. II. Bot. 9: 13. 1916.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3680 m., *Brass* 4239 (A, NY), 4322 (A, NY) (trees 2-5 m. high, very common in forests and often massed on fringes; branches erect and slender; branchlets reddish; leaves shining, aromatic; flowers white; fruit red); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4602 (A, NY) (erect-branched pale-foliaged tree to 3 m. high, fairly common on forest-borders; flowers white).

In referring the specimens from the Central Division of British New Guinea to *D. buxifolia*, I am depending upon Ridley's original description: the type was collected by the Wollaston Expedition on the slopes of Mt. Carstensz in Netherlands New Guinea. This description delineates a plant essentially similar to those I have cited in vegetative and floral features (assuming that Ridley's "pedunculis 1 mm. longis" is a misprint for "1 cm.>"). While the original description mentions the petals as 4 and describes them as only 3 mm. long, our plants have the petals usually 2 (rarely 3 or 4 in no. 4602) and 4.5-8 mm. long. As expansion of the petals is rapid after the opening of the calyx, measurements of them, unless made at maturity, are not very dependable. As regards the stamens, Ridley describes them as 20; no. 4602 has them 18-27, and nos. 4239 and 4322 have them 13-18. The carpels are said by Ridley to be 3; no. 4602 has them 1, 2, or 3, and the other *Brass* specimens have them 3-7.

Variation in number of floral parts has been considered grounds for the erection of species in *Drimys*, but I believe such numbers to be constant only within rather broad limits. Examination of the carpels of *Brass* 4602 shows that, although they appear to be fully formed, they are quite sterile and devoid of ovules: the carpels of nos. 4239 and 4322 are apparently fertile and no. 4322 has mature fruits with about 9 seeds each. It thus appears that the species in this section of *Drimys* are polygamo-dioecious. The staminate flowers of *D. buxifolia* appear to have 18-27 stamens, 1-3 carpels, and 2-4 petals, while the hermaphrodite flowers have 13-18 stamens, 3-7 carpels, and uniformly 2 petals. The species is characterized by its compact habit, its small coriaceous oblanceolate or obovate leaf-blades (usually 12-18 mm. long and 5-12 mm. broad) with 3-5 pairs of obscure short lateral nerves, and its small solitary flowers. Thus *D. buxifolia* is somewhat intermediate between such diminutive species as *D. vaccinioides* and *D. microphylla* on the one hand and *D. pittosporoides* Diels and its several allies on the other.

Two other species from the interior of Netherlands New Guinea of this relationship are *D. Versteegii* Diels and *D. reducta* Diels, separated from *D. buxifolia* on slight foliage differences and variations in number of floral parts. In order to ascertain their true status, the types of these three species should be compared, together with more recently collected material.

Dr. C. T. White has found that *Brass* 4239 and 4322 precisely match the specimens from the Musgrave Range of British New Guinea which

F. v. Mueller (in Trans. Roy. Soc. Vict. 1(2):1. 1889) referred to *D. hatamensis* Becc. However, Beccari's species is not of this relationship, having very much larger leaves and pistillate flowers without stamens. *Drimys buxifolia*, if my determination is correct, will probably be found as a very common species at high elevations throughout the central portion of New Guinea.

***Drimys oligandra* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) parvus epiphyticus ubique glaber, ramulis gracilibus subteretibus juventute rubiginosis; foliis oppositis vel suboppositis interdum ternatim verticillatis, petiolis gracilibus leviter complanatis 1–2 mm. longis, laminis chartaceis obscure pellucido-punctatis lanceolato-oblongis, 2.5–5 cm. longis, 5–13 mm. latis, basi gradatim angustatis, apice obtuse acuminatis, costa utrinque leviter elevata, nervis lateralibus utrinsecus 3 vel 4 debilibus anastomosantibus utrinque paullo prominulis, rete venularum immerso; floribus ♂ solis visis in axillis foliorum 1–3 dispositis, pedicellis gracilibus sub anthesi 17–21 mm. longis; sepalis 2 membranaceis parce glandulosis suborbicularibus, 1.5–2 mm. longis et latis, apice obtusis; petalis plerumque nullis raro 1 (oblongo-obovato, circiter 2.5 mm. longo et 1 mm. lato, apice rotundato); toro parvo, staminibus 4–6 uniseriatis sub anthesi 1.5–2 mm. longis, filamentis carnosius leviter complanatis, loculis circiter 0.6 mm. longis oblique verticalibus; carpellis 1 vel 2 sterilibus obovoideis sub anthesi circiter 0.8 mm. longis, carina stigmatum subapicali.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1300 m., *Brass* 12975 (TYPE), Feb. 1939 (small shrub, epiphytic in high rain-forest; branchlets and petioles red; flowers white).

Drimys oligandra is a very distinct species, apparently without close relatives, characterized by its narrow subacuminate leaves which are sometimes opposite and sometimes subternate. Its staminate flowers are very small, with proportionately long pedicels; petals are usually entirely lacking (in several buds dissected), but in one flower a single petal was found. The stamens are very few for the genus; while such a small number as 4–6 may be expected in the hermaphrodite flowers of certain species, I know of no other case in which they are so few in staminate flowers.

***Drimys rubiginosa* sp. nov.**

Frutex dioicus 1–1.5 m. altus ubique glaber, ramulis gracilibus leviter angulatis juventute rubiginosis demum cinereis; petiolis rugulosis 4–6 mm. longis, laminis subcoriaceis oblongo-obovatis, (2–) 3–5.5 cm. longis, (1–) 1.5–2.5 cm. latis, basi angustatis, apice obtusis, margine anguste recurvatis, costa supra subplana subtus prominente, nervis lateralibus utrinsecus 4–6 anastomosantibus utrinque leviter elevatis et interdum supra insculptis, rete venularum supra immerso subtus prominulo; floribus ♀ solis visis, 2–4 in axillis foliorum aggregatis, pedicellis gracilibus subcarnosis 5–10 mm. longis; sepalis 2 submembranaceis orbiculari-ovatis, 2.5–3 mm. longis et latis, apice obtusis; petalis 2 submembranaceis obovato-oblongis, 4–4.5 mm. longis, 1.8–2 mm. latis, obscure trinerviis, apice rotundatis; toro parvo, staminibus nullis; carpellis 2–4 obovoideo-ellipsoideis sub anthesi circiter 2 mm. longis et 1.3 mm. latis, apice obtusis vel subacutis, carina stigmatum ventrali circiter 1.5 mm. longa, ovulis circiter 16 irregulariter biseriatis;

fructibus ad 4 mm. longis, seminibus subclavatis circiter 1 mm. longis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12629 (TYPE), Feb. 1939 (shrub 1-1.5 m. high, in mossy-forest, common on an exposed summit; branchlets, petioles, leaf-margins, and pedicels red).

Drimys rubiginosa is characterized by having its small pistillate flowers completely lacking stamens. In foliage it suggests *D. pittosporoides* Diels, differing in its thinner leaf-blades with more obvious venation. The flowers described for *D. pittosporoides* are presumably hermaphrodite; they have 20-25 stamens and 5 or 6 carpels.

It seems likely that the staminate plant of *D. rubiginosa* is represented by *Brass* 9104 (Netherlands New Guinea: Lake Habbema, alt. 3225 m.; prostrate and ascending shrub to 30 cm. high, in heavy ground moss of forest). The leaves of this specimen are essentially similar to those of the type in texture, shape, and size, but have the veinlet-reticulation slightly closer. The two petals are similar to those of the type, the stamens are 12-14, and the sterile carpels are 1 or 2. Without seeing more ample staminate and pistillate material from the two cited localities, I cannot feel certain that the two specimens are conspecific.

***Drimys Brassii* sp. nov.**

Frutex vel arbor ad 4 m. alta compacta polygamo-dioica ubique glabra, ramulis teretibus rugulosis nigrescentibus demum cinereis; foliis alternatis vel suboppositis apicem ramulorum versus congestis, petiolis rugulosis complanatis inconspicuis 0.5-4 mm. longis, laminis coriaceis elliptico- vel obovato-oblongis, (1.5-)2-3.5 cm. longis, (4-)6-13 mm. latis, basi obtusis vel attenuatis, apice obtusis vel rotundatis, margine anguste vel interdum valde recurvatis, costa supra subplana subtus leviter elevata, nervis lateralibus utrinsecus 4-6 brevibus adscendentibus inconspicue anastomosantibus saepe obscuris, supra planis vel leviter impressis, subtus paullo prominulis, rete venularum immerso; floribus ♂ apicem ramulorum versus axillaribus, pedicellis rectis sub anthesi 7-10 mm. longis; sepalis 2 submembranaceis suborbicularibus, 4-5 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 5.5-7 mm. longis, circiter 2.5 mm. latis, apice rotundatis; toro convexo, staminibus 12-27 sub anthesi 1.3-3.5 mm. longis (exterioribus minimis) 2-4-seriatis, filamentis carnosius subteretibus, loculis 0.7-0.8 mm. longis oblique verticalibus; carpellis sterilibus 2 vel 3 (raro 1) obovoideis 1.5-2 mm. longis, apice uncinatis, carina stigmatum ventrali conspicua; floribus hermaphroditis non visis; pedicellis sub fructu crassis 6-15 mm. longis, carpellis 1-3 maturitate rugulosis ellipsoideis, 6-9 mm. longis, 4-5 mm. latis, basi et apice rotundatis, carina stigmatum fere ad basim elongata, pericarpio ut videtur carnoso, seminibus 15-24 nigrescentibus nitidis obovoideis vel semiobovoideis subfalcatis, 2-3 mm. longis, 1.3-2 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225-3300 m., *Brass* 9068 (TYPE), Aug. 1938 (very abundant in shrubberies and thickets as a shrub or tree 0.5-3 m. high; foliage brown; fruit purple-black), *Brass* 9536 (common as a low shrub [15-20 cm.] on sterile limestone slopes); 6 km. northeast of Lake Habbema, alt. 3000 m., *Brass* 10671 (shrub 30-80 cm. high, plentiful in shrubberies of an open peaty area in forest); 2 km. east of Wilhelmina-top, alt. 3800 m., *Brass & Myer-Drees* 10126 (tree or shrub attaining 4 m., abundant in low forest clumps about timber-line), *Brass & Myer-Drees* 10303 (large shrub in subalpine forest; branchlets reddish; fruit black).

Drimys Brassii is characterized by its stiff compact polygamo-dioecious habit, its small coriaceous leaf-blades which are irregularly crowded toward apices of branchlets, its two narrowly obovate-oblong petals, its 2-4-seriate stamens (in staminate flowers) which are usually about 20 in number, and its 1-3 carpels (apparently in both staminate and hermaphrodite flowers, although the latter were not seen). The only described species to which it can be closely related are *D. Lamii* Diels and *D. pittosporoides* Diels. In foliage it seems closest to *D. Lamii*, but that species is described as having about 5 "tepala," presumably petals. While stability in the number of petals is not too dependable in *Drimys*, those species which commonly have 2 petals are more stable in this respect than the species with numerous petals. It is very doubtful that *D. Brassii*, in many flowers of which only 2 petals have been found, will prove ever to have 5 petals. The new species differs from *D. pittosporoides* in its smaller and proportionately narrower leaf-blades; that species is said to have 5 or 6 carpels, while the staminate flowers of our species have only 1-3 carpels and the hermaphrodite flowers (judging from the fruits) a similar number.

The species of this relationship are difficult to understand without access to the types and a larger series of specimens. The proposed new species is based primarily upon the three collections from the vicinity of Lake Habbema, which are quite identical in foliage. *Brass* 9068 and 9536 include both staminate and fruiting material, apparently gathered from different individuals, while no. 10671 is in fruit only. The two cited specimens from Mt. Wilhelmina almost certainly belong here. *Brass & Myer-Drees* 10126 was taken from a staminate plant, while no. 10303 is in fruit. Both staminate flowers and fruits are similar to those from Lake Habbema, but the plants have slightly larger leaves and more obvious lateral nerves. My description covers these two specimens.

Two other specimens from Mt. Wilhelmina which probably belong here are *Brass & Myer-Drees* 10111 and 10309; the former is said to represent one of the chief species at timber-line. They differ from the specimens above-described in minor details of foliage, and both are inclined to have larger (usually 1-carpellate) fruits with as many as 50 seeds per carpel.

***Drimys macrantha* sp. nov.**

Arbor erecta 2-3 m. alta dioica (vel polygamo-dioica?) ubique glabra, ramulis crassis nigrescentibus apicem versus 3-6 mm. diametro subteretibus rugulosis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis supra leviter canaliculatis 3-7 mm. longis, laminis coriaceis obovatis, 5-9 cm. longis, 2-4 cm. latis, basi attenuatis et in petiolum decurrentibus, apice acutis vel breviter cuspidatis, margine anguste recurvatis, costa supra leviter subtus manifeste prominente, nervis lateralibus utrinsecus 9-12 cum aliis debilioribus interspersis erecto-patentibus supra prominulis etiam leviter insculptis subtus acute prominulis, rete venularum conspicuo copiose anastomosante utrinque valde prominulo; floribus ♂ apicem ramulorum versus in fasciculis laxis paucifloris dispositis, pedicellis sub anthesi 25-35 mm. longis saepe complanatis; sepalis 2 submembranaceis valde concavis suborbicularibus, 8-10 mm. longis et latis, apice rotundatis; petalis 5-7 inaequalibus submembranaceis obovatis, 10-14 mm.

longis, 4–6 mm. latis, basi conspicue angustatis, apice rotundatis, pinna-tinerviis; staminibus 55–65 toro conspicuo convexo 4- vel 5-seriatis, sub anthesi 2–4 mm. longis, filamentis carnosis subteretibus, loculis 0.8–1 mm. longis oblique subverticalibus; carpellis sterilibus plerumque 3 ellipsoideo-obovoideis circiter 2.5 mm. longis, carina stigmatum conspicua ventrali et apicali; floribus ♀ vel hermaphroditis non visis; pedicellis sub fructu crassis complanatis, carpellis 2 vel 3 rugosis obovato-ellipsoideis, 7–9 mm. longis, 4–5 mm. latis, basi breviter stipitatis, apice rotundatis, carina stigmatum ad basim ventrali, pericarpio carnoso, seminibus 15–20 castaneis nitidis falcato-ellipsoideis circiter 3 mm. longis et 2 mm. latis valde complanatis, basi subacutis, apice rotundatis.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4519 (A. TYPE, NY), July 16, 1933 (small stiff-branched tree 2–3 m. high, common on forest-borders; leaves stiff, with recurved apex and margins, glaucous when young; flowers white).

Drimys macrantha is closely related only to *D. grandiflora* Ridley, from which it differs in its petiolate leaves which, although paler beneath, are not "white," its more numerous secondaries and more obvious veinlet-reticulation, its shorter pedicels, and its even larger flowers. It is also suggestive of *D. reticulata* Diels and *D. cyclopum* Diels, differing from both in its broader leaf-blades, much larger flowers, more numerous stamens, etc. The new species resembles *D. hatamensis* Becc. in foliage, but that species also has smaller flowers and 2 (sometimes 3 or 4) petals.

Drimys arfakensis Gibbs, Phyt. Fl. Arfak Mts. 135. 1917.

NETHERLANDS NEW GUINEA: Arfak Mts., in mossy-forest along the track to Angi from Momi, alt. 1800 m., *Kanehira & Hatusima* 13408 (shrub 1 m. high; flowers white).

The cited specimen shows some points of departure from the original description, but nevertheless it seems to represent a form of Gibbs' species; it bears staminate flowers, whereas the type has only pistillate. Our specimen differs from the type in having its leaf-blades smaller and with immersed veinlets and its petals 7–9 (rather than 12–14), shorter, and proportionately broader. The stamens are 19–22, the sterile carpels 4 or 5.

Drimys reticulata Diels in Bot. Jahrb. 54: 242. 1916.

NETHERLANDS NEW GUINEA: 15–18 km. southwest of Bernhard Camp, Idenburg River, alt. 1800–2150 m., *Brass* 11857 (very slender tree 3–4 m. high, a characteristic species of early second growths in mossy-forest), *Brass* 12149 (slender tree 3 m. high, plentiful in open places in mossy-forest; leaves glaucous beneath; flowers white), *Brass* 12494 (slender tree 2–4 m. high, one of the principal species in young seral growths in mossy-forest; leaves very glaucous beneath).

The cited specimens agree well with the description of *D. reticulata*, otherwise reported only from the type, collected in the adjacent Sepik region of Northeastern New Guinea. Although Brass' field notes indicate that the leaves are glaucous beneath when fresh, when dried they appear to be concolorous, as stated in Diels' description. The original specimen is in fruit, and therefore I add a description of the inflorescences based on the Brass collections. Of the cited numbers, 12494 is staminate, 12149 is pistillate, while the specimens of 11857, apparently taken from two trees, represent both sexes. If my identification is correct, the species is characterized by its strictly dioecious habit, small flowers, 4–6 petals, and re-

duced number of ovules. A comparison with the type is desirable before the following description can be definitely accepted as pertaining to *D. reticulata*.

Slender dioecious tree; flowers in small axillary fascicles of 2-4 (occasionally solitary) near ends of branchlets, the pedicels slender, 8-15 mm. long at anthesis; ♂ flowers: sepals 2, membranaceous, obscurely pellucid-glandular, broadly ovate, 2.5-3 mm. long and broad, subacute at apex; petals 4-6, submembranaceous, obscurely glandular, narrowly obovate-oblong, 4-5 mm. long, 1.5-1.8 mm. broad, obtuse at apex; torus small, the stamens 15-20, at anthesis 1-1.8 mm. long, 2- or 3-seriate, the filaments subterete, the locules about 0.4 mm. long, obliquely subvertical; carpels 2 or 3, sterile, ovoid-ellipsoid, about 1 mm. long, subacute at apex, the stigmatic ridge ventral, extending to base; ♀ flowers similar to the ♂ but without stamens, the carpels 3-6, ellipsoid, about 1.5 mm. long at anthesis, the stigmatic ridge ventral-apical, extending about halfway to base, the pericarp carnosae, the ovules 2-4.

***Drimys obovata* sp. nov.**

Arbor gracilis 5-8 m. alta polygamo-dioica (vel dioica?) ubique glabra, ramulis subteretibus rugulosis apicem versus 2-4 mm. crassis brunneis vel cinereis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis crassis 3-10 mm. longis, laminis coriaceis anguste obovatis, 8-17 cm. longis, 2-6 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice conspicue et plerumque acute cuspidatis vel breviter acuminatis, margine anguste sed valde recurvatis, costa valida supra elevata subtus prominente, nervis lateralibus utrinsecus 10-18 subrectis anastomosantibus utrinque valde prominulis, rete venularum utrinque leviter prominulo vel supra obsoleto; floribus ♂ ramulorum apice vel apicem versus congestis in fasciculis 6-12-floris dispositis, pedicellis gracilibus saepe complanatis sub anthesi 1-3.5 cm. longis; sepalis 2 submembranaceis late ovatis vel suborbicularibus, 5-6 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 7-11 mm. longis, 1.5-2 mm. latis, apice obtusis; toro convexo, staminibus 35-55 circiter 4-seriatis sub anthesi 2-6 mm. longis (exterioribus minimis), filamentis carnosis subteretibus, loculis subverticalibus 0.8-1.2 mm. longis basi leviter divergentibus; carpellis sterilibus 2-4 ellipsoideis 2-3.5 mm. longis, carina stigmatum ventrali longa; floribus hermaphroditis non visis; pedicellis sub fructu ad 3.5 cm. longis, carpellis 4-6 (vel abortu paucioribus) obovoideis, maturitate 5-7 mm. longis et 4-5 mm. latis, basi breviter stipitatis, apice rotundatis, pericarpio carnosae, stigmatibus elongatis, seminibus 10-16 nigrescentibus nitidis obovoideis complanatis, circiter 2.5 mm. longis et 1.5 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, alt. 2200-2350 m., *Brass* 11295 (TYPE), Nov. 1938 (undergrowth tree 5-8 m. high, common on ridges in fagaceous forest), *Brass* 11312 (slender tree 5-6 m. high, common on banks of forest streams); 9 km. northeast of Lake Habbema, alt. 2750-2800 m., *Brass* 10567 (slender tree 6 m. high, on open bank of a stream in mossy-forest; leaves concave; pedicels flat, red), *Brass* 10570 (tree 5 m. high, on open bank of a stream in forest; flowers white).

The cited specimens all bear staminate flowers except no. 11312, from which the fruits are described. *Drimys obovata* is characterized by its large

coriaceous narrowly obovate leaves with inconspicuous venation, its large flowers, and the large number of stamens in its staminate flowers. Its only close relatives seem to be *D. coriacea* Pulle and *D. dictyophlebia* Diels. From the first of these, the new species is distinguished by its more slender branchlets, proportionately narrower and more obviously pointed leaf-blades, often immersed and less obvious veinlets, and its 2 (rather than 3 or 4) petals. From *D. dictyophlebia*, *D. obovata* differs in having the costa of its leaf-blades raised rather than impressed above, its nerves less obvious on both surfaces, and its flowers larger and with more numerous stamens. From the description, I believe that *D. dictyophlebia* is represented in the present collection by the following fruiting specimen: Netherlands New Guinea: 4 km. southwest of Bernhard Camp, Idenburg River, alt. 900 m., *Brass* 13704 (tree 3–5 m. high, common in undergrowth of semi-open places in *Agathis* forest; leaves aromatic, subbullate; petioles red).

Drimys hatamensis Becc. Malesia **1**: 185. 1877.

NETHERLANDS NEW GUINEA: Arfak Mts., Angi, in forest by Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima* 13785, 13935 (trees 2–3 m. high; petals white).

The cited specimens, which, like the type, come from the Arfak Mountains, agree with Beccari's description in all essential details and I have little hesitation in referring them to his species. Beccari described only the pistillate flowers, in which the petals are said to be two. *Kanehira & Hatusima* 13935 bears staminate flowers, in which the petals appear to be 2, 3, or 4 (in several buds examined). Both sepals and petals are conspicuously pellucid-glandular; the petals, which are readily caducous, are about 8 mm. long and 2.5 mm. broad at anthesis. The stamens are 28–32 and 2–4 mm. long; the carpels are sterile and 1 or 2 in number. Beccari states that the pistillate flowers have no stamens and 4 carpels. Number 13785, bearing immature fruits, has the carpels 2–5.

Diels (in Bot. Jahrb. **54**: 242. 1916) referred three collections from the Sepik region of Northeastern New Guinea to *D. hatamensis*, and my present collections contain several specimens from British and Netherlands New Guinea which are very close to Beccari's species. These are the following:

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225 m., *Brass* 9362, 9491 (trees to 3 m. high, frequent in forest undergrowth); 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass* 10246 (tree 5 m. high). BRITISH NEW GUINEA: Central Division, Mt. Obree, alt. about 2400 m., *Lane-Poole* 347; Mt. Tafa, alt. 2300 m., *Brass* 4046 (A, NY), 4124 (A, NY) (common large shrubs in mossy-forest); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4506 (A, NY) (spreading shrub in forest-borders; flowers white).

Of these specimens, only *Brass* 4506 and *Lane-Poole* 347 bear staminate flowers, the others being in fruit. The staminate flowers are essentially similar to those of the *Kanehira* and *Hatusima* collection, but the petals are slightly smaller and scarcely glandular, and the stamens are 24–30. Differences among the cited specimens in foliage are intangible, those from the Arfak Mountains having the veinlet-reticulation slightly less obvious. On the whole, I believe that Beccari's concept may well be taken to include the specimens from the central portion of New Guinea, but this conclusion

should be verified by future study. The species represented by the Brass and Lane-Poole specimens is apparently quite common in the Central Division. Lane-Poole (Rep. For. Res. Papua 86. 1925) referred his plant to *D. cyclosum* Diels, a species with leaf-blades proportionately much narrower. Dr. C. T. White states that the above-cited Brass specimens from the Central Division are similar to plants which F. v. Mueller (in Trans. Roy. Soc. Vict. 1(2): 1. 1889) determined as *D. piperita* Hook. f. *Drimys piperita* is a Bornean species with 8–10 petals, and its occurrence in New Guinea is questionable; Diels has not mentioned this species as occurring in New Guinea and none of my specimens suggest it.

BUBBIA v. Tiegh.

Originally proposed (in Jour. de Bot. 14: 293. 1900) for a group of seven species from Lord Howe Island and New Caledonia, *Bubbia* was first used for a New Guinean species by Dandy (in Jour. Bot. 72: 40. 1934). Burt (in Hook. Ic. Pl. 34: pl. 3315. 1936) noted that several of the New Guinean species referred to *Drimys* in reality belong in *Bubbia*; he indicated that *Bubbia* is a well-marked genus and made some of the required combinations. While I cannot accept Burt's reduction of *Belliolum* to *Bubbia*, the latter seems excellently separated from *Drimys*, and most workers in this group will not agree with Diel's recombination of the two genera (in Bot. Jahrb. 54: 240–245. 1916).

It is now obvious that *Bubbia* is highly developed in New Guinea. Diels (l. c.) recognized six species in this group (*Drimys*, *pro parte*), Ridley added one (*Drimys umbellata*), and on the basis of recently collected material I find it necessary to propose eleven more. I am inclined to question Burt's transfer of *Drimys parviflora* Ridley to *Bubbia*; from the description this appears to be a true *Drimys*. As now constituted, *Bubbia* contains 19 species from New Guinea, one from Queensland, two from Lord Howe Island, and eight from New Caledonia. A full appraisal of these species cannot be made with the material at hand, but from the descriptions most, if not all, appear to be well founded.

I am indebted to Prof. I. W. Bailey for calling to my attention Burt's discussion of the genus *Tetralthalamus* (in Kew Bull. 1938: 458–460. 1938). This genus may now be definitely reduced to *Bubbia*, as noted below under *B. montana*.

Bubbia bullata (Diels) comb. nov.

Drimys bullata Diels in Bot. Jahrb. 54: 243. 1916.

Although *Drimys bullata*, from Northeastern New Guinea, was described on the basis of a sterile specimen, there seems no reason to doubt its place in the genus *Bubbia*. Diels compares it with *Drimys Ledermannii* [*Bubbia Ledermannii* (Diels) Burt], from which it is said to differ in its bullate leaf-blades with the nerves impressed above and sharply prominent beneath.

Bubbia montana (Lauterb.) comb. nov.

Tetralthalamus montana Lauterb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee Nachtr. 319. 1905, in Bot. Jahrb. 58: 15. f. 4. 1922; Engl. in E. & P. Nat. Pfl. ed. 2. 21: 229. f. 100. 1925.

Tetralthalamus, originally described as a monotypic genus of Guttiferae

related to *Garcinia*, was discussed in a very informative paper by Burtt (in Kew Bull. **1938**: 458–460. 1938), who placed it in the Winteraceae as a close relative of *Bubbia*. In all its morphological and anatomical details, *Tetralthalamus*, according to Burtt, falls into the Winteraceae, and there can be no doubt that this is the correct position for the plant. The only point in which *Tetralthalamus* is at variance with *Bubbia* is in the coherence of its carpels, and one may doubt whether this is quite as complete as implied in figures *F* and *G* of Lauterbach's illustration, cited above. In figures *C* and *E* of this plate there is evidence that the coherence of the carpels is only superficial. In some other species of *Bubbia* (e. g. *B. pachyantha* A. C. Sm.) a coherence of the carpels in flower has been noted, and this in itself cannot be used as a character to separate *Tetralthalamus* from *Bubbia*. I have no hesitation in going a little farther than Burtt and definitely reducing Lauterbach's genus to *Bubbia*. According to the original description and the illustration of *Tetralthalamus montanus*, the essential details of the species are as follows:

Petiole about 15 mm. long; leaf-blades elliptic-obovate, 15–18 cm. long, 4–6 cm. broad, obtusely cuspidate at apex, with about 11 pairs of primary lateral nerves ascending at an angle of about 50° and prominulous on both surfaces, the veinlets forming a reticulum; inflorescence terminal, apparently sessile and with about 3 primary rays, these twice-branched; pedicels 3–4 mm. long; calyx with 3 small lobes; petals 8, elliptic-oblong, the outer ones about 3.5 mm. long and 2 mm. broad, the inner ones smaller; stamens 12, about 1 mm. long and biseriate, with horizontal apical locules; carpels 4, adnate in flower, the stigmatic ridge short, strictly apical, the ovules 3, pendulous.

The species is thus far known only from *Schlechter 13984*, from the Bismarck Mountains of Northeastern New Guinea at an altitude of 1200 m. Its relationship is with *B. oligocarpa* (Schlecht.) Burtt, than which it has smaller leaves and flowers, more numerous petals, fewer stamens with strictly horizontal (rather than oblique) anther-locules, and 4 adnate rather than 2 free carpels. A more distant relative of *B. montana* is *B. sylvestris* (described below).

Bubbia calothyrsa (Diels) comb. nov.

Drimys calothyrsa Diels in Bot. Jahrb. **54**: 244. 1916.

According to the original description, this species, thus far known only from the Sepik region of Northeastern New Guinea, is characterized by its large coriaceous leaf-blades with about 25 pairs of lateral nerves, these spreading at nearly right angles from the costa. The inflorescence is said to be ample and pedunculate, the petals up to 10 mm. long, the stamens 25–30, and the carpels 3–6.

Bubbia sororia (Diels) comb. nov.

Drimys sororia Diels in Bot. Jahrb. **54**: 245. 1916.

Like its close relative *B. calothyrsa*, *B. sororia* is known only from the Sepik region and has large leaf-blades with spreading nerves. It differs from its ally in being more slender throughout, with the leaf-blades more obviously nerved beneath, the petals smaller, and the stamens fewer.

***Bubbia pachyantha* sp. nov.**

Arbor pauciramosa ad 5 m. alta ubique glabra, ramulis crassis (apicem versus 3–7 mm. diametro) nigrescentibus rugosis subteretibus; petiolis crassis rugulosis 9–17 mm. longis anguste alatis; laminis crasse coriaceis oblongo-ellipticis, 6.5–10 cm. longis, 2.5–4 cm. latis, basi obtusis et in petiolum conspicue decurrentibus, apice obtusis et interdum inconspicue mucronulatis, margine valde revolutis, costa valida rugosa supra elevata subtus prominente, nervis lateralibus utrinsecus 15–20 inconspicuis valde patentibus utrinque prominulis et cum rete venularum anastomosantibus; inflorescentiis terminalibus vel apicem ramulorum versus axillaribus pauciramosis paniculatis 3–6 cm. longis, pedunculis crassis rugulosis angulatis ad 3 cm. longis, ramulis paucis angulatis, pedicellis similibus ad 9 mm. longis (floribus interdum subsessilibus); calyce crasse coriaceo subrotato 6–8 mm. diametro, margine irregulariter 5–7-lobato, lobis ovato-deltoides circiter 1.5–2 mm. longis et 2–4 mm. latis, apice rotundatis vel obtusis, sinibus acutis; petalis 4 crasse coriaceis sub anthesi patentibus obovato-oblongis, 8–11 mm. longis, 6–7 mm. latis, basi obtusis, apice rotundatis; toro crasso columnari leviter quadrangulato circiter 2 mm. alto et 3 mm. diametro; staminibus plerumque 12 crasse coriaceis 2-seriatis obovoideis leviter complanatis, 2–2.5 mm. longis, filamentis apicem versus circiter 2 mm. latis basim versus contractis, loculis apicalibus vel subobliquis discretis circiter 1 mm. longis; carpellis 3 vel 4 sub anthesi adnatis obovoideis circiter 3 mm. longis angulatis, carina stigmatum ventrali et apicali, ovulis circiter 20 ut videtur 2-seriatis; calyce sub fructu persistente, carpellis maturis 3 vel 4 discretis et divergentibus, irregulariter obovoideo-subglobosis, 8–10 mm. diametro, carina stigmatum indistincta praeditis, pericarpio sublignoso; seminibus circiter 20 endocarpio spongioso irregulariter congestis nigris oblongo-ellipsoideis, circiter 3 mm. longis et 1.2 mm. latis, falcatis, basi et apice rotundatis.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3550–3600 m., *Brass* 4371 (A, TYPE, NY), June 29, 1933 (sparsely branched tree about 5 m. high, fairly common in forests; leaf-blades very stiff, the margins much recurved toward base, the upper surface dark, dull green, the lower surface gray, the costa yellowish; petals cream-colored, at length red; seeds black).

This remarkably distinct species of *Bubbia* is characterized not only by its comparatively small coriaceous leaf-blades and winged petioles, but also by the leathery texture of all its floral parts and the fact that its 3 or 4 carpels are firmly adnate at anthesis along the ventral sutures; thus the gynaecium has the appearance of a compound ovary with a 3- or 4-parted stellate stigma. As the fruits develop, however, the carpels separate and mature in normal fashion for the genus. The seeds are unusually long and sharply curved. The stamens are usually quite regularly arranged, one being at the base of each petal and a superposed pair alternate with each pair of petals.

***Bubbia monocarpa* sp. nov.**

Arbor ad 2.5 m. alta glabra, ramulis rugulosis subteretibus apicem versus 4–6 mm. crassis; petiolis crassis semiteretibus 11–18 mm. longis; laminis chartaceis anguste elliptico-obovatis, 20–28 cm. longis, 7–9.5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine subplanis, subtus glaucis et ut videtur farinoso-ceriferis, costa supra leviter

impressa subtus prominente, nervis lateralibus primariis utrinsecus 15–17 anastomosantibus angulo 65–75° a costa abeuntibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque leviter prominulis; inflorescentia terminali subsessili, radiis primariis circiter 4 adscendentibus gracilibus sub anthesi ad 8 cm. longis bis ramosis granulato-rugulosis; pedicellis gracilibus 3–5 mm. longis; calyce chartaceo rotato suborbiculari 3–3.5 mm. diametro vix lobato, margine subintegro; petalis 5 subcarnosis obovato-ellipticis, sub anthesi 3.5–5 mm. longis et 2–3 mm. latis, apice rotundatis; toro inconspicuo, staminibus circiter 17 carnosus obovoideis 2-seriatis 1.2–1.5 mm. longis, filamentis complanatis parce luteo-glandulosis apicem versus 0.6–1 mm. latis, loculis horizontalibus apicalibus 0.3–0.4 mm. longis; carpello unico obovoideo sub anthesi 1–1.5 mm. longo, apice rotundato et carina stigmatum elongata sub anthesi circiter 1.5 mm. longa coronato, loculo transverso, ovulis 30–40 pluriseriatis e placentis elongatis pendulis.

NETHERLANDS NEW GUINEA: Dalman, 45 km. inland from Nabire, alt. 400 m., *Kanehira & Hatusima 12105* (TYPE), Mar. 1, 1940 (tree 2.5 m. high, in mossy-forest; flowers violet).

Bubbia monocarpa is related to *B. oligocarpa* (Schlecht.) Burtt, from which it differs in its shorter and more slender inflorescence, its essentially circular and unlobed calyx, its 5 (rather than 6 or 7) petals, which are smaller, its essentially horizontal (rather than oblique) anther-locules, and its solitary carpel. From *B. longifolia* (described below), the new species differs in obvious foliage-characters, as well as in its calyx, smaller and fewer petals, and solitary carpel. The species of this alliance are characterized by their strictly apical stigmatic ridge and pendulous ovules.

***Bubbia longifolia* sp. nov.**

Arbor parva gracilis ad 1.5 m. alta glabra, ramulis teretibus granulato-rugulosis apicem versus circiter 6 mm. crassis; petiolis crassis angulatis vel anguste alatis 12–15 mm. longis; laminis chartaceis obovato-oblanceolatis, 35–40 cm. longis, 9–11 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice inconspicue cuspidatis vel subacutis, margine inconspicue recurvatis, supra in sicco fusco-olivaceis subtus glaucis et ut videtur farinoso-ceriferis, costa supra valde impressa subtus prominente, nervis lateralibus primariis utrinsecus 20–22 angulo 55–60° a costa abeuntibus valde anastomosantibus utrinque acute elevatis, secundariis similibus sed debilioribus, rete venularum intricato utrinque prominulo vel subtus subimmerso; inflorescentia terminali vel subterminali subsessili, radiis primariis circiter 3 gracilibus sub anthesi ad 10 sub fructu ad 18 cm. longis 2- vel 3-plo ramosis leviter angulatis; pedicellis gracilibus sub anthesi 3–5 mm. longis demum longioribus; calyce parvo 3-lobato, lobis patentibus chartaceis deltoideo-ovatis, 1–1.5 mm. longis, 2–2.5 mm. latis, apice obtusis vel apiculatis; petalis tenuiter carnosus in alabastro agglutinatis ut videtur circiter 6 oblongo-obovatis, ad 7 mm. longis et 3.5 mm. latis, apice rotundatis; toro inconspicuo, staminibus 14–16 coriaceis plerumque 2-seriatis, circiter 2.5 mm. longis, filamentis complanato-obovoideis apicem versus 0.8–1.2 mm. latis, loculis apicalibus horizontalibus contiguis circiter 0.5 mm. longis; carpellis 3 obovoideis subcomplanatis, sub anthesi 2–3 mm. longis, basim versus angustatis, apice rotundatis et carina lineari cristiformi praeditis, loculo transverso, ovulis 24–32 irregulariter 2-seriatis pendulis; carpellis

maturitate ut videtur solitariis, fructu subgloboso ad 3 cm. diametro, carina stigmatum inconspicua, pericarpio crasse carnosio; seminibus numerosis turbinatis, 7–9 mm. longis, circiter 5 mm. latis, conspicue et irregulariter plicato-rugosis, basi abrupte contractis, apice rotundatis, in pulpa copiosa nidulantibus, testa tenui dura, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 175 m., *Brass* 13868 (TYPE), Apr. 1939 (undergrowth tree 1.5 m. high, in rain-forest of lower mountain-slopes; flower-buds red; fruit pink).

Bubbia longifolia occurs at an unusually low altitude for the genus in New Guinea and has the longest leaves thus far known in *Bubbia*. The obovate-lanceolate leaf-blades, which are glaucous and apparently farinose-ceriferous beneath, amply characterize the species. Its closest relative appears to be *B. oligocarpa* (Schlecht.) Burt, from which it differs in its longer leaves, fewer stamens with strictly horizontal rather than obliquely apical-lateral anther-locules, and 3 rather than 2 carpels. The fruit of the new species is large for the genus and the seeds are noteworthy for their coarsely plicate-rugose surface. Another relative of *B. longifolia* may be *B. polyneura* (Diels) Burt, which, according to the description, has leaf-blades with about 40 pairs of lateral nerves and an inflorescence with comparatively numerous and strong rays.

***Bubbia sylvestris* sp. nov.**

Frutex vel arbor parva ubique glabra, ramulis subteretibus rugosis crassis (apicem versus 5–8 mm. diametro); petiolis rugulosis supra complanatis 1–2 cm. longis; laminis coriaceis obovato-ellipticis, 14–22 cm. longis, 5–7.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, supra fusco-olivaceis, subtus glaucis vel pallidioribus, margine saepe leviter recurvatis, costa valida supra subplana vel leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 14–20 cum secundariis angulo 65–75° a costa abeuntibus utrinque acute prominulis et cum rete venularum prominulo copiose anastomosantibus; inflorescentia terminali subsessili, radiis primariis ut videtur 6–8 ad 9 cm. longis 1- vel 2-plo ramosis gracilibus siccitate granulosis et striatis; bracteis bracteolisque minutis caducis, pedicellis ad 15 mm. longis plerumque brevioribus; calyce coriaceo 2- vel 3-lobato, lobis patentibus orbiculari- vel deltoideo-ovatis, 2–3 mm. longis, 3–5 mm. latis, apice rotundatis vel obtusis; petalis 8–10 chartaceis vel coriaceis elliptico- vel obovato-oblongis, leviter inaequalibus, exterioribus 8–10 mm. longis et circiter 6 mm. latis, apice rotundatis; toro columnari-pulvinato, 1–2 mm. alto, 2–2.5 mm. diametro; staminibus 22–35 crasse coriaceis 2- vel 3-seriatis clavato-obovoideis 1.5–2.5 mm. longis, filamentis leviter complanatis apicem versus 0.7–1.5 mm. latis basi contractis, loculis horizontalibus apicalibus 0.5–0.7 mm. longis; carpellis 3–5 coriaceis alabastro cohaerentibus mox liberis obovoideis, sub anthesi 2–3 mm. longis, basi contractis, apice rotundatis, carina stigmatum apicali ad 1.5 mm. longa, ovulis 25–40 pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ulap Trail, *Clemens* 41142 (TYPE), April 6, 1940 (shrub or small tree; flowers pale, greenish); Ogeramngang, alt. about 1800 m., *Clemens* 4463 (shrub 1 m. high, in forest; flowers green); Yunzaing, alt. about 1500 m., *Clemens* 4122 (tree or shrub about 3 m. high, in forest on mossy ridge; leaf-blades pale beneath; flower-buds green).

The three cited specimens are not precisely similar, the type having the

only fully developed inflorescence and having leaves which are conspicuously glaucous beneath. The other two specimens have more congested inflorescences and leaves which are apparently pale green beneath. In other respects the specimens are quite similar and I have little doubt that they represent the same species. A fourth plant which probably belongs here is *Clemens 5008*, also from the Morobe District (Ogeramnang, alt. about 1800 m.; small slender tree on forested hill; flowers green or purplish). This specimen, with leaves like those of the type, has very immature buds and apparently has the petals about 15 and the stamens about 40. Another collection which probably represents *B. sylvestris* is *Clemens 41800* (Boana, Morobe District, alt. 750–1350 m.), with leaf-blades up to 26 cm. long and 9.5 cm. broad, glaucous beneath. This specimen is in fruit and has the primary rays of the inflorescence reduced in number, probably through loss. The carpels are borne on conspicuous stipes 5–8 mm. long and are inequilaterally ellipsoid, up to 12 by 8 mm., with a subapical stigmatic ridge about 2 mm. long. The seeds are 15–20 in number, black, obovoid, about 4 by 3 mm.

Bubbia sylvestris appears to be closely related only to *B. oligocarpa* (Schlecht.) Burt. but that species has the leaf-blades larger and with more definitely ascending nerves, the rays of the inflorescence fewer, and the flowers smaller and with fewer parts (petals 6, stamens about 18, carpels 2). From *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm. the new species differs in its proportionately narrower leaf-blades with less widely spreading lateral nerves, sessile and less ample inflorescence, and floral details such as its broader petals, etc.

***Bubbia Clemensiae* sp. nov.**

Frutex vel arbor parva glabra, ramulis subteretibus rugosis crassis (apicem versus 4–7 mm. diametro); foliis alternatis, petiolis crassis rugulosis supra complanatis 1–1.5 cm. longis, laminis subcoriaceis supra nitidis ellipticis vel obovato-ellipticis, 17–24 cm. longis, 6–10 cm. latis, basi obtusis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine leviter recurvatis, costa valida supra leviter elevata vel complanata subtus prominente, nervis lateralibus primariis utrinsecus 12–20 cum secundariis brevioribus angulo 55–65° a costa abeuntibus utrinque acute elevatis marginem versus anastomosantibus, rete venularum supra leviter prominulo subtus inconspicuo vel subimmerso; inflorescentia terminali crassa pedunculata, pedunculo ad 7 cm. longo, radiis primariis ut videtur 3 vel 4 crassis ad 6 cm. longis nunc unifloris nunc apicem versus flora 2–4 gerentibus, pedicellis crassis 1–6 cm. longis ut pedunculo saepe valde complanatis; calyce coriaceo rotato 6–9 mm. diametro irregulariter 6–9-lobato, lobis brevibus 2–4 mm. latis, apice obtusis vel obscure apiculatis; petalis plerumque 6 crasse coriaceis, alabastro valde imbricatis, demum patentibus, inaequalibus, elliptico-oblongis, sub anthesi 11–17 mm. longis et 5–12 mm. latis, apice rotundatis; toro conspicuo subconico sub anthesi 3–4 mm. longo et circiter 2.5 mm. diametro; staminibus numerosis (100–125) confertis 5- vel 6-seriatis crasse coriaceis clavato-obovoideis, 2.5–3.5 mm. longis, filamentis leviter complanatis apicem versus 1.2–2 mm. latis inferne contractis, loculis horizontalibus apicalibus 0.6–1 mm. longis; carpellis 5–11 crasse coriaceis, alabastro

adpressis et subadnatis, mox liberis, obovoideis, sub anthesi circiter 3 mm. longis et diametro, angulatis, apice convexis, carina stigmatum conspicua apicali, ovulis circiter 15 anguste obovoideis pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, alt. 1750–1800 m., *Clemens* 5157 (TYPE), Jan. 27, 1937 (small shrub or tree, less than 1 m. high, in hilly forest; petals dark maroon; anthers yellow; carpels green), *Clemens* 4596 (same locality).

Bubbia Clemensiae is characterized by its large thick flowers with numerous stamens. Its closest relationship is probably with the preceding new species (*B. sylvestris*), from which it differs not only in its larger leaves and coarser inflorescence, but also in having its calyx irregularly 6–9-lobed (rather than regularly 2- or 3-parted), its petals fewer and larger, its stamens many more, and its carpels more numerous and with fewer ovules.

***Bubbia idenburgensis* sp. nov.**

Arbor ad 4 m. alta glabra, ramulis brunneis rugosis subteretibus apicem versus 4–7 mm. crassis; foliis apicem ramulorum versus irregulariter alternatim congestis, petiolis crassis rugulosis supra complanatis 1–2 cm. longis, laminis coriaceis anguste obovato-ellipticis, (8–) 11–24 cm. longis, (3–) 3.5–7 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel obtuse cuspidatis, supra siccitate fusco-olivaceis, subtus glaucis, margine anguste recurvatis, costa supra impressa vel subplana subtus prominente, nervis lateralibus primariis utrinsecus 8–15 saepe inconspicuis angulo 55–65° a costa abeuntibus marginem versus anastomosantibus utrinque prominulis vel subplanis, rete venularum plerumque immerso interdum utrinque paullo prominulo; inflorescentia sub fructu terminali subsessili, radiis primariis 3–6 ad 11 cm. longis (centrali quam aliis longiore) 2(3)-plo ramosis rugulosis leviter angulatis, pedicellis gracilibus ad 1 cm. longis; calyce sub fructu subpersistente parvo irregulariter 2- vel 3-lobato, lobis tenuiter carnosus obscure glandulosus late reniformi-ovatis, 1–1.5 mm. longis, 2–3 mm. latis; toro convexo, staminum cicatricibus paucis ut videtur 2-seriatis; carpellis 4–6 vel interdum abortu paucioribus raro 1 obovoideo-turbinatis, ad 8 mm. diametro stipite basali conspicuo 0.5–1.5 mm. longo excluso, carina stigmatum inconspicua lineari 3–4 mm. longa apicali-ventrali praeditis, pericarpio crasso; seminibus 2–10 castaneis falcatis obovoideis, 3–4.5 mm. longis, 2–2.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, testa dura.

NETHERLANDS NEW GUINEA: 4–6 km. southwest of Bernhard Camp, Idenburg River, alt. 900–1250 m., *Brass* 13028 (TYPE), Mar. 1939 (tree 3 m. high, in rain-forest undergrowth; fruits red), *Brass* 13313 (tree 2–4 m. high, common in mossy-forest undergrowth; leaves very glaucous beneath; fruit unripe).

Although the two cited specimens differ slightly in foliage, they are quite similar in fruiting inflorescences and are certainly conspecific. The leaf-blades of the type are slightly the larger and have the venation more obvious; the lateral veins of no. 13313 are essentially immersed and the costa is deeply impressed above.

Bubbia idenburgensis is characterized by its comparatively narrow coriaceous leaf-blades, its few and large seeds, and the position of its stigma on the upper part of the ventral edge of the carpel. Presumably the flowering carpel has the stigma partially ventral and partially apical. The new

species is perhaps most closely related to *B. umbellata* (Ridley) Dandy, but has the lateral nerves of the leaf-blade fewer, the petioles longer, and the inflorescence with fewer but longer rays. From *B. oligocarpa* (Schlecht.) Burt the new species differs in its proportionately narrower leaf-blades with fewer lateral nerves and less conspicuous venation, its more numerous carpels (probably 4-6 in flower), and its ventral-apical rather than strictly apical stigmatic ridge. The relationship of *B. idenburgensis* to *B. sylvestris* (above described) is less close.

***Bubbia glauca* sp. nov.**

Frutex vel arbor parva ad 2 m. alta glabra, ramulis subteretibus cinereis vel brunneis rugosis apicem versus 3-5 mm. crassis; foliis alternatis vel suboppositis, petiolis gracilibus rugulosis leviter canaliculatis 8-15 mm. longis, laminis chartaceis anguste obovatis, 12-19 cm. longis, (3.5-)4-6 cm. latis, basi gradatim attenuatis et in petiolum decurrentibus, apice subacutis vel breviter cuspidatis, supra fusco-olivaceis, subtus albedo-glaucis, margine inconspicue recurvatis, costa supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12-16 angulo 50-60° a costa abeuntibus marginem versus anastomosantibus utrinque valde prominulis, secundariis inconspicuis et rete venularum utrinque plerumque leviter prominulis; inflorescentia sub fructu terminali subsessili, radiis primariis 3-5 suberectis ad 8 cm. longis (longitudine variis) gracilibus granulato-rugulosis subsimplicibus vel semel ramosis, pedicellis 3-5 mm. longis; calyce sub fructu parvo subcoriaceo 3-lobato, lobis deltoideis circiter 1 mm. longis et 2 mm. latis subacutis; toro parvo, staminum cicatricibus paucis; carpellis (ut videtur sub anthesi 2) maturis solitariis vel binis, levibus vel leviter rugulosis, subglobosis, 10-12 mm. diametro, basi minute stipitatis, carina stigmatum inconspicua 3-5 mm. longa apicali-ventrali praeditis, pericarpio coriaceo circiter 2 mm. crasso; seminibus 8-11 in pulpa spongiosa nidulantibus, placenta incrassata apicali-ventrali gerentibus, castaneis levibus obovatis, circiter 4 mm. longis et 2.5 mm. latis, utrinque rotundatis.

BRITISH NEW GUINEA: Western Division, Palmer River, 2 miles below junction with Black River (upper Fly River region), alt. 100 m., *Brass 7191* (TYPE), July, 1936 (shrub or small tree 2 m. high, uncommon in ridge-forest undergrowth; leaves aromatic, the blades gray beneath).

Bubbia glauca, which occurs at an unusually low elevation for the genus in New Guinea, is closely related only to *B. idenburgensis* (above described), with which it has in common an inconspicuous short apical-ventral stigmatic ridge on the fruit. The two species are also similar in leaf-shape, but *B. glauca* is more slender throughout and has the blades thinner in texture and with more obvious venation on both surfaces. The rays of the fruiting inflorescence of *B. glauca* are comparatively simple, each having very few fruits near its apex and being essentially unbranched; the rays of the inflorescence of *B. idenburgensis* are 2- or often 3-times branched and consequently the fruits are much more numerous. From the absence of additional scars on the fruiting torus of *B. glauca*, it seems likely that the flowers will prove to have only two carpels.

***Bubbia Archboldiana* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis teretibus fuscis rugosis crassis (apicem

versus 5–8 mm. diametro); foliis irregulariter alternatis et apicem ramulorum versus congestis, petiolis crassis supra complanatis 4–9 mm. longis, laminis rigide patentibus coriaceis anguste elliptico-obovatis, (8–)12–18 cm. longis, 3–5.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine interdum inconspicue recurvatis, supra fuscis nitidis, subtus pallidioribus, costa lata supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12–15 cum secundariis paullo debilioribus angulo 60–70° a costa abeuntibus supra valde prominulis subtus subplanis vel inconspicue prominulis, cum rete venularum supra manifesto subtus immerso copiose anastomosantibus; inflorescentia terminali subsessili vel pedunculo crasso ramulis simili ad 2 cm. longo praedita, radiis primariis 6–11 divaricatis 5–8 cm. longis (ramulis et floribus inclusis) 2- vel 3-plo ramosis crassis rugulosis, pedicellis rectis 3–7 mm. longis; calyce parvo irregulariter 2- vel 3-lobato, lobis patentibus obtusis deltoideo-ovatis, 1.2–1.5 mm. longis, 2–3 mm. latis; petalis 4 vel 5 carnosius alabastro imbricatis mox patentibus ellipticis vel obovato-ellipticis, 5–6 mm. longis, 3–4 mm. latis, apice rotundatis; toro convexo; staminibus circiter 17 plerumque 2-seriatis obovoideis 1.8–2 mm. longis, filamentis complanatis apicem versus circiter 1 mm. latis, loculis oblique horizontalibus apicalibus; carpellis 9 vel 10 congestis obovoideis, sub anthesi 2–2.5 mm. longis et 1.2–1.5 mm. latis, basi angustatis, apice subcomplanatis, carina stigmatum apicali et ventrali sed basim non attingente, ovulis 12–16 biseriatis ventralibus.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2100 m., *Brass* 12712 (TYPE), Feb. 1939 (tree 3 m. high, in an open situation in tall mossy-forest; lower leaf-surface glaucous; petals green, the entire inflorescence otherwise red).

Bubbia Archboldiana and the following new species (*B. megacarpa*) are remarkably similar in general appearance, but they are distinguished as later noted. Together they form a well-marked group, characterized by their elongate stigmas, which are extended along both the ventral edge and the apex of the carpel. *Bubbia Archboldiana* is perhaps most closely related, among described species, to *B. oligocarpa* (Schlecht.) Burt., differing in its short petioles, proportionately narrower leaf-blades, more copiously branched inflorescence, fewer petals, 9 or 10 (rather than 2) carpels, and the stigmatic character mentioned above. From *B. sylvestris* (above described) the new species differs in its fewer and much smaller petals, fewer stamens, more numerous carpels, and the obvious characters of stigmas and ovule-attachment. The new species may also be compared with *B. sororia* (Diels) A. C. Sm., a species with longer petioles, broader leaf-blades with more spreading lateral nerves, more ample inflorescence, more numerous and larger petals, fewer carpels, etc.

***Bubbia megacarpa* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis pallide brunneis valde rugosis subteretibus apicem versus 4–7 mm. crassis; foliis alternatis, petiolis crassis rugosis supra complanatis vel subalatis 6–12 mm. longis, laminis coriaceis in sicco utrinque fuscis anguste elliptico-obovatis, 11–18 cm. longis, 3–5.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel

rotundatis, margine saepe valde recurvatis, costa supra impressa subtus prominente et rugosa, nervis lateralibus primariis utrinsecus 10-14 cum secundariis debilioribus angulo 55-65° a costa abeuntibus utrinque valde prominulis, cum rete venularum utrinque leviter prominulo copiose anastomosantibus; inflorescentia terminali pedunculo crasso brevi (ramulo defoliato simili) praedita, radiis primariis 3-5 divaricatis 5-7 cm. longis granulato-rugosis angulatis vel complanatis 1- vel 2-plo ramosis, pedicellis rigidis angulatis ad 10 mm. longis (floribus interdum subsessilibus); calyce parvo irregulariter 2- vel 3-lobato, lobis late ovatis, 1.5-2 mm. longis, 2.5-3.5 mm. latis, margine erosis; petalis 4 carnosis obovato-oblongis, 6-7 mm. longis, 4-5 mm. latis, apice rotundatis; toro breviter conico; staminibus 18-20 coriaceis 2- vel 3-seriatis obovoideis 1.5-2 mm. longis, filamentis apicem versus 1-1.3 mm. latis, loculis oblique apicalibus horizontalibus; carpello unico coriaceo inaequilaterali subobovoideo, sub anthesi circiter 2 mm. longo et 2.5 mm. lato et 1.5 mm. crasso, interdum marginis dorsalis apice leviter uncinato, margine apicali-ventrali rotundato, carina stigmatum elongata apicali et fere ad basim ventrali, loculo lineari valde curvato, ovulis circiter 50 vel ultra irregulariter pluriseriatis; pedicellis sub fructu crassis (2.5-4 mm. diametro) ad 15 mm. longis; fructu coriaceo transverse ellipsoideo, ad 4 cm. longo et crasso et 5 cm. lato, utrinque rotundato, basi complanato, apice curvato, carina stigmatum elongata conspicue ornato, pericarpio ruguloso, seminibus numerosis in pulpa copiosa ut videtur mucilaginoso irregulariter nidulantibus nigris obovoideis, circiter 5 mm. longis et 3 mm. latis, basi subacutis, apice rotundatis, testa tenui, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass 10249* (TYPE), Oct. 1938 (tree about 3 m. high, common in forest undergrowth in wet bottoms; flowers white).

As previously mentioned, this species and the preceding (*B. Archboldiana*) closely resemble each other and are characterized by their elongate stigmas. In *B. megacarpa* the stigmatic ridge is much longer, extending along the entire apex of the carpel and along the ventral edge virtually to the base. In *B. Archboldiana* the stigmatic ridge extends over about two-thirds of the apex and a similar portion of the ventral edge. The ovulation of the two species is quite different, the locule of *B. megacarpa* being sharply curved to parallel the stigmatic ridge and extending from the base to near the dorsal apex, while the ovules are numerous and arranged in several irregular series. In *B. Archboldiana*, on the other hand, the locule is quite straight and does not reach the base, while the ovules are not more than 16, being arranged in two rows. A further difference, of course, pertains to the solitary carpel of *B. megacarpa* as contrasted with the 9 or 10 carpels of *B. Archboldiana*. In other floral details the two plants are quite similar, but the carpellary differences are striking and apparently constant.

Among less obvious differences, *B. megacarpa* has the leaf-blades only inconspicuously paler beneath rather than glaucous, and the veinlets more obvious beneath. *Bubbia megacarpa* has the rays of the inflorescence fewer, more obviously angled, and less copiously branched. The fruit of

B. megacarpa is quite unique among those thus far known in *Bubbia*, for its size, shape, and number of seeds.

***Bubbia argentea* sp. nov.**

Arbor parva, ramis crassis erectis, ramulis rugosis subteretibus apicem versus 5–8 mm. crassis; foliis irregulariter alternatis et apicem ramulorum versus saepe mox delapsis, petiolis validis rugulosis supra complanatis 10–18 mm. longis, laminis coriaceis anguste ellipticis, 12–17 cm. longis, 4–6.5 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, supra fusco-olivaceis, subtus argenteo-glaucis, costa valida granulato-rugulosa supra subplana subtus prominente, nervis lateralibus primariis utrinsecus 15–20 angulo 70–80° a costa abeuntibus conspicue anastomosantibus utrinque valde elevatis, nervis secundariis similibus sed brevioribus et cum rete venularum intricato utrinque prominulo copiose anastomosantibus; inflorescentia sub fructu juvenili terminali subsessili, radiis primariis 10–13 divergentibus ad 9 cm. longis 2- vel 3-plo ramosis rugulosis angulatis vel complanatis, pedicellis gracilibus 3–8 mm. longis; calyce coriaceo parvo 2- vel 3-lobato, lobis patentibus reniformi-ovatis, circiter 1.5 mm. longis, 2–2.5 mm. latis, apice obtusis; toro semigloboso-convexo, staminum cicatricibus circiter 20 ut videtur 2-seriatis; carpellis ut videtur 4–6 (demum interdum abortu paucioribus) post anthesin obovoideis, basi angustatis, apice rotundatis et carina stigmatum conspicua cristiformi apicali 0.6–1 mm. longa coronatis, ovulis circiter 12 pendulis; carpellis submaturis obovoideo-subglobosis ad 6 mm. diametro stipite basali valido 1–1.5 mm. longo excluso, carina stigmatum brevi inconspicua apicali, pericarpio crasso ruguloso; seminibus plerumque 4–6 nigris falcatis oblongis, circiter 2.5 mm. longis, 1–1.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, pericarpio duro.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4740 (A, NY, TYPE), Aug. 7, 1933 (small tree with thick erect branches, rare in forests; leaves silver-gray beneath; immature fruit resinous; seeds black).

Although the cited collection lacks flowers and bears only immature fruits, it is obviously an undescribed species of the relationship of *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm., differing from both in its shorter petioles, smaller leaf-blades which are narrowly elliptic rather than oblanceolate, and more numerous and more spreading primary inflorescence-rays.

***Bubbia calophylla* sp. nov.**

Arbor parva (?) glabra, ramulis subteretibus crassis (apicem versus 7–10 mm. diametro); foliis alternatis, petiolis rugulosis 4–5 mm. diametro supra complanatis circiter 3 cm. longis, laminis subcoriaceis late oblongo-ellipticis, 25–30 cm. longis, 10–14 cm. latis, basi obtusis vel gradatim angustatis et in petiolum decurrentibus, apice ut videtur subrotundatis, margine leviter recurvatis, supra nitidis, subtus subglaucis, costa valida rugulosa supra leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 25–35 cum secundariis subsimilibus et paullo debilioribus angulo 70–85° a costa abeuntibus utrinque acute elevatis et conspicue anastomosantibus, rete venularum intricato utrinque conspicue prominulo; inflorescentia terminali multiflora, pedunculo ut ramulis crasso ad 7 cm. longo, radiis primariis

paucis ad 15 cm. longis 2- vel 3-plo ramosis, pedunculis secundariis crassis striatis complanatis 7-9 cm. longis, pedicellis sub fructu 3-10 mm. longis; calyce sub fructu persistente subcoriaceo 3-lobato, lobis patentibus deltoideo-ovatis, circiter 1.5 mm. longis et 2-3 mm. latis, apice obtusis vel subacutis; toro convexo coriaceo, staminum cicatricibus circiter 3-seriatis; carpellis 5-8 turbinatis parce luteo-glandulosis, basi conspicue stipitatis (stipite 2-3 mm. longo), apice rotundatis, in specimine nostro immaturis ad 6 mm. diametro, carina stigmatum inconspicua apicali brevi (0.6-1 mm. longa), pericarpio coriaceo; seminibus 8-15 castaneis obovoideis, 2-2.5 mm. longis, 1-1.5 mm. latis, valde falcatis, basi et apice rotundatis, in pulpa spongiosa irregulariter nidulantibus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeram nang, alt. about 1800 m., *Clemens 5061* (TYPE), Jan. 19, 1937.

Although flowers of this plant have not been seen, the material is ample to demonstrate that the species is undescribed. *Bubbia calophylla* is doubtless of the relationship of *D. calothyrsa* (Diels) A. C. Sm., with which it has in common large leaf-blades with broadly spreading lateral nerves. However, *B. calophylla* has longer petioles, leaf-blades broader in proportion and essentially elliptic rather than oblanceolate, with more numerous lateral nerves and in general more conspicuous reticulate venation, longer primary inflorescence-rays and on the whole a more ample inflorescence, and a short, nearly punctiform, apical stigma rather than an elongate stigmatic crest.

BELLIOLUM v. Tiegh.

In proposing the genus *Belliolum*, van Tieghem (in Jour. de Bot. **14**: 330. 1900) included in it four New Caledonian species, of which only one (*B. Pancheri* (Baill.) v. Tiegh.) was known in flowering condition; this species may be considered the type of the genus. *Belliolum* is distinguished from *Bubbia* by having the anther-locules longitudinal and extrorse-lateral rather than horizontal and apical. In *B. Pancheri* the anther-locules are placed toward the base of the stamens.

Burt (in Hook. Ic. Pl. **34**: pl. 3315. 1936), in connection with his new species *Bubbia haplopus* from the Solomons, expressed the opinion that *Belliolum* cannot be maintained as distinct from *Bubbia*, and consequently made several new combinations under the latter name. The basis for this opinion lies in the fact that certain specimens appeared to Burt to be intermediate, as regards the staminal characters, between *Belliolum* and *Bubbia*. He discussed at some length the New Caledonian collection of *Schlechter 15348* (referable to *Belliolum crassifolium* (Baill.) v. Tiegh.), good flowering material of which is also available to me. The stamens of this species bear strictly vertical anther-locules, which are extrorse-lateral near the apex of the stamens. In fundamental details these stamens are similar to those of *Belliolum Pancheri*; the fact that the locules are borne near the apex rather than toward the base of the stamens does not necessarily weaken the generic character.

Another species discussed by Burt as intermediate between the two genera is *Bubbia amplexicaulis* (Vieill.) Dandy [*Bubbia auriculata* v.

Tieghe.],¹ in which "the anther-thecae are apical and almost touch at their tips, then they diverge downwards at an angle of 45° ; that is to say they are intermediate between transverse and longitudinal." In examining the numerous New Guinean species which are clearly referable to *Bubbia*, I have noted some in which the anther-locules are thus obliquely apical, although usually they are more horizontal than an angle of 45° would indicate. Stamens with this type of anther-locule are quite different from those of *Belliolum* proper, as represented by *B. Pancheri* and *B. crassifolium*. In the latter species the anther-locules, although subapical, are strictly longitudinal and are exceeded by a conspicuous continuation of the connective.

On the basis of material now available, therefore, it seems that *Belliolum* and *Bubbia* may be retained, the former having anther-locules which are always longitudinal and exceeded apically by the connective, while the latter has anther-locules which are horizontal (or subhorizontal), apical, contiguous, and not exceeded by the connective. This conclusion, of course, is provisional and must be tested with a larger series of specimens than is now available. For the time being it seems advisable to retain both genera as established by van Tieghem.

***Belliolum haplopus* (Burt) comb. nov.**

Bubbia haplopus Burt in Hook. Ic. Pl. 34: pl. 3315. 1936.

SOLOMON ISLANDS: Bougainville: Okomo, Buin, alt. about 400 m., *Waterhouse* 90 (NY, type coll.); Koniguru, Buin, alt. 800 m., *Kajewski* 1994, 2007 (trees 10–15 m. high, common in rain-forest; leaf-blades silvery beneath; petals white; fruits pink when ripe, up to 16 mm. long and 14 mm. broad; native names: *oigu*, *ororoyu*); Kupei Gold Field, alt. 950 m., *Kajewski* 1658 (tree to 15 m. high, common in rain-forest; fruit pink, up to 25 mm. long and 16 mm. broad). Ula wa: *Brass* 2959 (tree 10 m. high, common in lowland rain-forest; bark thin, gray; leaf-blades grayish beneath; flowers and fruits white).

The cited specimens agree well with a duplicate of the type and with Burt's excellent description and plate. With more abundant material, a slight expansion of the original characters should be noted, as follows: petioles up to 3 cm. long; leaf-blades up to 26 cm. long and 10 cm. broad, the primary lateral nerves 8–16 per side. The calyx is rotate and essentially entire at margin rather than bilobed; I have not found more than 10 petals (as noted by Burt) in my flowers, but these are sometimes up to 8 mm. long. There is considerable variation in the length of the pedicels (if the often 1-flowered peduncles are so interpreted); these range from about 1.5 cm. (*Brass* 2959) to 9 cm. (*Kajewski* 1658).

¹ *Bubbia amplexicaulis* is based upon *Drimys amplexicaulis* Vieill. ex Parment. in Bull. Sci. France & Belg. 27: 308. pl. 10, f. 34. 1896. I cannot agree with Dandy (in Jour. Bot. 72: 40. 1934) that Vieillard's name is adequately published by Parmentier. The description consists merely of the anatomical details of the leaf and stem, and the illustration shows a cross-section of the petiole; no specimen is cited. It seems that the many new species proposed by Parmentier in his extensive work "Histoire des Magnoliacées" must be considered *nomina subnuda* and ignored from a nomenclatural point of view. Since no specimens are cited, the species cannot be recognized by subsequent workers unless they have access to Parmentier's specimens. For the species under discussion, therefore, I accept the name *Bubbia auriculata* v. Tiegh. (1900).

Belliolum Burtianum sp. nov.

Arbor ad 10 m. alta ubique glabra, ramulis subteretibus rugulosis apicem versus 3–5 mm. crassis; foliis apicem ramulorum versus subalternatis, petiolis gracilibus leviter canaliculatis 12–22 mm. longis, laminis chartaceis vel subcoriaceis in sicco fusco-olivaceis anguste obovato-ellipticis, 9–16 cm. longis, 4–6 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, subtus inconspicue ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 9–11 sub angulo 65–75° a costa abeuntibus anastomosantibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque paullo prominulis; inflorescentia ramulis brevibus lateralibus terminali, radiis ut videtur 2–5 nunc unifloris nunc trifloris, pedicellis gracilibus leviter angulatis 2–6 cm. longis; calyce tenuiter coriaceo rotato circulari 4–5 mm. diametro, margine subintegro inconspicue bilobato; petalis circiter 25 subcarnosis 4–6-seriatis, exterioribus elliptico-oblongis ad 12 mm. longis et 7 mm. latis apice rotundatis, interioribus magnitudine gradatim reductis, intimis lanceolato-oblongis circiter 5 mm. longis et 1.5 mm. latis apice obtusis; staminibus circiter 3-seriatis 40–45 subcarnosis 2.5–3 mm. longis loculos verticales laterales 1–1.2 mm. longos paullo supra medium gerentibus, connectivo complanato obtuso 0.4–0.7 mm. ultra loculos productis; carpello unico obovoideo-turbinato sub anthesi circiter 3 mm. longo et 2.5 mm. lato, basi breviter stipitato, apice truncato et carina stigmatum nigra lineari circiter 2 mm. longa coronato, loculo obovoideo, ovulis circiter 35 placentis elongatis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, alt. 950 m., *Kajewski* 1680 (TYPE), Apr. 10, 1930 (tree to 10 m. high, common in rain-forest; petals white; carpel green).

Belliolum Burtianum is of the relationship of *B. haplopus* (Burt) A. C. Sm., from which it differs in its more numerous and larger petals, its stamens with the anther-locules nearer the apex and with the connective much less obviously produced, and its solitary carpel. The 3 or 4 carpels of *B. haplopus* are less regular in shape and have a stigmatic ridge only about 1 mm. long; the ovulation is essentially similar. In foliage the two species are close, but the leaves of *B. Burtianum* are substantially smaller and thinner on the average. *Kajewski's* description of the new species as "common" may not be reliable, as he obtained *B. haplopus* at the same locality and doubtless considered them the same.

It is a pleasure to name the new species for Mr. B. L. Burt, whose studies of this group of plants have greatly aided in clarifying their relationships.

Belliolum gracile sp. nov.

Arbor ad 5 m. alta glabra, ramulis subteretibus rugulosis apicem versus 2–3 mm. crassis; foliis subalternatis, petiolis gracilibus leviter canaliculatis 7–18 mm. longis, laminis chartaceis oblanceolatis, (6–)7–12 cm. longis, (2–)2.5–4.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine planis vel inconspicue recurvatis, supra fusco-olivaceis, subtus albido-punctato-ceriferis, costa supra leviter impressa subtus valde elevata, nervis lateralibus primariis utrinsecus 7–10 sub angulo

55–65° a costa abeuntibus anastomosantibus et saepe curvatis utrinque prominulis, secundariis debilibus et rete venularum utrinque leviter prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus paucis ut videtur saepe solitariis, pedicellis gracilibus sub fructu ad 23 mm. longis; calyce sub fructu chartaceo rotato circulari ad 3 mm. diametro, margine integro, demum caduco; toro conspicuo semigloboso, cicatricibus staminum paucis; carpellis maturis solitariis vel binis coriaceis obovoideis, ad 18 mm. longis et 11 mm. latis, basi ad stipitem 1–2 mm. longum angustatis, apice rotundatis et carina stigmatum inconspicua 1–2 mm. longa coronatis, pericarpio extra ruguloso 1.5–3 mm. crasso; seminibus 10–20 (plerumque 3 vel 4 maturis, aliis abortivis) in pulpa spongiosa nidulantibus, obovoideis, 4–5 mm. longis, circiter 3 mm. latis, basi angustatis, apice rotundatis, placentis horizontalibus circa loculi medium dispositis.

SOLOMON ISLANDS: *G u a d a l c a n a l*: Tutuve Mt., alt. 1700 m., *Kajewski* 2630 (slender tree 4–5 m. high, common in poor rain-forest, the trunk to 7 cm. diam.; common name: *ses-a-vere*). *S a n C r i s t o v a l*: Hinuahaoro, alt. 900 m., *Brass* 2898 (TYPE), Sept. 22, 1932 (tree 4 m. high, in mountain-forest; leaf-blades gray beneath, the venation more obvious above; immature fruit smooth, green; all parts faintly aromatic), *Brass* 3063, 3063A (spreading shrub or small tree 1.5–3 m. high, in mountain-forest; leaf-blades gray-green beneath; fruit green, at length red, smooth, fleshy).

Although *B. gracile* is known only from fruiting specimens, I venture to describe it as new because of its vegetative differences from *B. haplopus* (Burt) A. C. Sm., doubtless its closest ally. In comparison with that species, *B. gracile* has the branchlets and petioles substantially more slender and the leaf-blades smaller and proportionately narrower, with fewer lateral nerves. From *B. Burtianum* (above described) the new species also differs in its more slender and small-leaved habit; it is expected that floral characters will provide additional distinctive points. Differences in fruit are also discernible between *B. gracile* and *B. haplopus*, the fruit of the latter tending to be subglobose rather than obovoid, with a longer stigmatic ridge (3–5 mm. long) and more numerous seeds (10–15 often maturing and an equal or greater number abortive).

***Belliolum Kajewskii* sp. nov.**

Arbor ad 8 m. alta glabra, ramulis subteretibus fuscis vel purpurascentibus apicem versus 3–5 mm. crassis; foliis alternatis confertis, petiolis gracilibus rugulosis leviter canaliculatis 1–2.5 cm. longis, laminis in sicco fuscis subcoriaceis oblanceolatis, (7–)10–17 cm. longis, 3–5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice obtusis vel paullo emarginatis, margine leviter recurvatis, subtus inconspicue punctato-ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 13–17 sub angulo 65–75° patentibus brevibus anastomosantibus utrinque valde prominulis, secundariis numerosis et rete venularum intricato utrinque prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus interdum 2 vel 3 fasciculatis interdum apice radiorum paucis, pedicellis sub fructu 1.5–4 cm. longis; calyce sub fructu chartaceo rotato 4–5 mm. diametro, margine subintegro obscure 3-vel 4-lobato; toro semigloboso, cicatricibus staminum ut videtur 2- vel 3-seriatis; carpellis maturis solitariis vel binis oblongo-subglobosis, ad 16

mm. longis et 13 mm. latis, basi rotundatis et abrupte breviter stipitatis, apice truncatis et carina stigmatum lineari 5-6 mm. longa praeditis, pericarpio coriaceo extra ruguloso 2-3 mm. crasso; seminibus 20-40 obovoideis, 3-4 mm. longis, circiter 2 mm. latis, apice rotundatis, placentis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: *Bougainville*: Lake Luralu, Koniguru, Buin, alt. 1500 m., *Kajewski 2099* (TYPE), Aug. 17, 1930 (small tree to 8 m. high, common in rain-forest; native name: *nomovour*). *Gadalcana*: Uulolo, Tutuve Mt., alt. 1200 m., *Kajewski 2574* (small tree 5-6 m. high, common in rain-forest; leaf-blades slightly silvery beneath; fruit red when ripe; native name: *ruvor*).

Belliolum Kajewskii is distinguished from the other Solomon Islands species of *Belliolum* discussed above by its narrow oblanceolate leaf-blades with more spreading lateral nerves. Its leaves are somewhat similar in shape to those of *B. gracile* (above described), but they are thicker and darker in color, and the two species are differentiated by obvious characters of the fruit; that of *B. Kajewskii* is proportionately broader, more flattened at apex, and with a longer stigmatic ridge and more numerous seeds. In foliage, the new species suggests certain New Caledonian species of *Belliolum*, such as *B. crassifolium* (Baill.) v. Tiegh., but all of those known to me have more complex inflorescences.

MAGNOLIACEAE

TALAUMA Juss.

Talauma oreadum Diels in Bot. Jahrb. **54**: 240. 1916.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass 12976* (tree 5 m. high, in rain-forest underbrush, rare; flowers brownish white, fragrant; fruit red, 55 mm. long and 25 mm. in diameter); Arfak Mts., Angi, near Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima 13899* (tree 10 m. high, in forest; flowers white); Island of Japan, Seroei, alt. 250-370 m., *Neth. Ind. For. Serv. 30413, 30619*.

The cited specimens agree very well with the original description of *T. oreadum*, otherwise reported only from the Sepik region of Northeastern New Guinea. This is the only true *Talauma* thus far recorded from New Guinea, *T. papuana* Schlecht. having been referred to *Elmerrillia* by Dandy.

ELMERRILLIA Dandy

Elmerrillia papuana (Schlecht.) Dandy in Kew Bull. **1927**: 261. 1927.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 300 m., *Brass & Versteegh 13594* (tree 23 m. high, occasional in primary rain-forest on the slope of a ridge; trunk 48 cm. diam.; crown not wide-spreading; bark 11 mm. thick, gray-brown, scaly; sap-wood yellow; heart-wood dark brown; flowers white); Island of Japan, Seroei, alt. 370 m., *Neth. Ind. For. Serv. 30451*.

The species has previously been reported from Northeastern and British New Guinea. I have not sufficient material to evaluate the two varieties proposed by Dandy, but his var. *glaberrima* (in Kew Bull. **1928**: 185. 1928) appears to be represented by *Brass & Versteegh 13594*. *Elmerrillia sericea* C. T. White (in Jour. Arnold Arb. **10**: 212. 1929) is doubtfully distinct from *E. papuana*.

MONIMIACEAE

TRIMENIA Seem.

Trimenia papuana Ridl. in Trans. Linn. Soc. II. Bot. 9: 144. 1916.

NETHERLANDS NEW GUINEA: 9–20 km. northeast of Lake Habbema, alt. 2200–2700 m., *Brass* 10862 (tree 8 m. high, frequent in low substage of tall forest; flowers yellow), *Brass* 11292 (tree 3–6 m. high, common in open high undergrowth of ridge-crest forest; branches erect; young flowers white; fruit red), *Brass* 11601 (tree 8 m. high, in substage of midmountain forest, Bele River); Balim River, alt. 1600 m., *Brass* 11764 (erect shrub or small tree 2–3 m. high, plentiful in *Vaccinium* scrub on infertile sandy soil; fruit red); 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12628 (tree 2–3 m. high, in mossy-forest, common in low scrub on an exposed summit; branches upright; flowers white).

The cited specimens are apparently the first since the collection of the type, which was obtained in southern Netherlands New Guinea. Gilg and Schlechter (in Bot. Jahrb. 55: 199. f. 1. 1918) referred several collections from Northeastern New Guinea to this species, but later (in Bot. Jahrb. 58: 248. 1923) they correctly distinguished their material as a new species, *T. myricoides* Gilg & Schlecht. Several recent collections by Clemens in Northeastern New Guinea are also referable to *T. myricoides*.

DRYADODAPHNE S. Moore

Dryadodaphne S. Moore in Jour. Bot. 61: 109. 1923; Kosterm. in Rec. Trav. Bot. Néerl. 34: 605. 1937.

Isomerocarpa A. C. Sm. in Jour. Arnold Arb. 22: 250. 1941.

During her work on the New Guinean species of Lauraceae, Dr. C. K. Allen called my attention to the fact that the genus *Dryadodaphne*, originally described as a member of the family, had been referred by Kostermans to the Monimiaceae. Kostermans believes that Moore's genus is identical with *Levieria* Becc. and that the species involved is possibly *L. montana* Becc. Although I have not seen the type of Moore's genus (*Forbes* 724 from British New Guinea), his description does not indicate that a species of *Levieria* was under consideration. *Levieria* has numerous stamens and lacks staminodes, and the anthers do not dehisce by valves. The presence of such valves, although not stated by Moore, is implied by his reference of the genus to the Lauraceae.

Among the few genera of Monimiaceae with anthers dehiscing by valves (subfamily Atherospermoideae), only the recently described *Isomerocarpa* agrees with *Dryadodaphne* in essential details. Moore states that the flowers of *Dryadodaphne* are unisexual, whereas the numerous flowers of *Isomerocarpa* which I have dissected are always hermaphrodite. According to Kostermans, the type specimen of *Dryadodaphne* "represents a male plant with flowers still in bud." In view of the immaturity of flowers, therefore, I consider it probable that Moore overlooked the juvenile carpels, which are deeply immersed in the urceolate receptacle and somewhat obscured by the numerous staminodes. In other respects, including dimensions of all parts of the plant, Moore's description of *Dryadodaphne celastroides* agrees with the specimens which I have referred to *Isomerocarpa novo-*

guineensis, and I have little hesitation in considering the plants conspecific.

While regretting the necessity of replacing the name *Isomerocarpa*, proposed only about a year ago, I nevertheless feel it advisable to accept the name *Dryadodaphne* for this interesting group in the Monimiaceae. A full description and a discussion of the place of the genus is to be found in my treatment of *Isomerocarpa*. The synonymy of the species follows:

Dryadodaphne novoguineensis (Perk.) comb. nov.

Daphnandra novoguineensis Perk. in Bot. Jahrb. **52**: 217. f. 5. 1915.

Dryadodaphne celastroides S. Moore in Jour. Bot. **61**: 109. 1923.

Isomerocarpa novoguineensis A. C. Sm. in Jour. Arnold Arb. **22**: 251. 1941.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

STUDIES IN THE LAURACEAE, V SOME EASTERN ASIATIC SPECIES OF BEILSCHMIEDIA AND RELATED GENERA.

CAROLINE K. ALLEN

A LARGE portion of the eastern Asiatic species of *Beilschmiedia* and *Cryptocarya* from the herbaria of the Arnold Arboretum, Gray, and New York Botanical Garden has been on loan to Dr. Kostermans for several years. As there is no immediate prospect of its return, it has seemed advisable to gather together such material as is available at present and to attempt to place the mass of Chinese specimens from recent collections. The intention of this paper, therefore, is not to present a complete study of the genera involved but rather to make usable what specimens we have. Originally *Beilschmiedia*, *Cryptocarya* and *Endiandra* only were to be considered, but on detailed study it proved desirable to propose a new combination in *Dehaasia* and a new genus, *Lauromerrillia*. *Cryptocarya* yielded a Chinese representative of the Indian genus *Syndiclis*. It goes without saying that in all probability some revision will be necessary when type material is available.

The following key will separate roughly the genera below. Unfortunately, it is almost always imperative that flowering specimens be at hand.

Flower parts in threes or multiple of threes

Fertile stamens 9

Leaves subverticillate in clusters at branchlet tips; branchlets conspicuously pale grey; flowers few with perianth lobes often unequal, borne on long slender pedicels; fruit subtended by expanded claviform pedicels.....*Dehaasia*.

Leaves not subverticillate; branchlets not conspicuously pale grey; flowers numerous with perianth lobes equal or subequal, borne on short pedicels; fruit subtended by pedicels symmetrically enlarged

Leaves usually conspicuously reticulate; flowers with perianth tubes absent or very shallow; fruit not costate.....*Beilschmiedia*.

Leaves usually not reticulate or very minutely so; flowers with perianth tube equalling the lobes in length; fruit conspicuously costate, at least in young stages*Cryptocarya*.

Fertile stamens 6; 6 glands alternate with perianth lobes.....*Lauromerrillia*.

Fertile stamens 3.....*Endiandra*.

Flower parts in twos or multiple of twos; fertile stamens 4.....*Syndiclis*.

The following letters are used to indicate the institutions in which the numbers cited are to be found: Arnold Arboretum (AA); Philippine Bureau of Science, Manila (M); New York Botanical Garden (NY); Jardin des Plantes, Paris (P); United States National Arboretum (Department of Agriculture) (USDA); United States National Herbarium (USNH); Vienna Botanical Garden (V).

Dehaasia Bl.**Dehaasia Cairocan** (Vidal), comb. nov.

Beilschmiedia Cairocan Vidal, Rev. Pl. Vasc. Filip. 223. 1886; Ceron, Cat. Pl. Herb.

Manila 124, 1892; Merrill, Enum. Philip. Pl. 2: 198. 1923.

Haasia borneensis Meissn. in DC. Prodr. 15¹: 61. 1864.

Dehaasia borneensis F.-Vill., Nov. Append. 179. 1880. Non B. & H.

Beilschmiedia spec. Vidal, Sinops. 10, t: 78, F. 1883.

PHILIPPINE ISLANDS: *Ahern* 130 (USNH); *Barros* 17902 (USNH); *Belen* 23331 (AA, USNH); *Bernardo* 13113 (USNH); 15239 (AA); 17918 (USNH); *Curran* 10384, 10392 (USNH); *Franco* 21937 (USNH), 27791 (AA, USNH); *Klemme* 6643, 7125 (USNH); *Merrill* 2599 (USNH); *Paraíso* 19740 (USNH); *Ramos* 1075 (USNH); *Rosenbluth* 12807 (USNH); *Wenzel* 1238 (AA); *Whitford* 1683 (USNH).

HAINAN: *Lau* 538 (AA, NY, USDA, USNH, V), 1610 (AA, NY).

From the literature cited above one learns that both Meissner and Vidal had only fruiting material on which to base the species under discussion, and, if one may judge from Vidal's plate, that fruit was not fully mature. The fruit of the material cited from the Philippines appears typical of the genus *Dehaasia*. The long pedicel is inflated somewhat more at the apex than at its base and is usually as long as the fruit which it subtends. The flowering specimens show the typical slender panicles bearing flowers with unequal perianth lobes, the outer three being less than one half the length of the inner, and somewhat scale-like. All of the specimens resemble other members of the genus in their greyish twigs at once striate and roughened with leaf scars and the numerous oblanceolate or narrowly obovate long-petioled leaves borne in dense whorls at the tips of the branchlets. The Hainan numbers cited show precisely the same characteristics as those from the Philippines with the exception of the flowers which have perianth lobes of equal size.

A word should be added regarding the names *Haasia* and *Dehaasia*. *Dehaasia* was described by Blume in Rumphia, I: 161. 1835, in honor of Dirk de Haas. Blume states clearly that in the Dutch language "de" and "van" are so closely connected with the family name that one can not take the liberty of separating them unless the resulting name should be discordant or too long and unwieldy. Nees (Syst. Laurin. 372. 1836) uses *Haasia*, giving in a foot note, presumably a quotation, Blume's statement concerning the origin of the generic name, but Nees misquotes and omits the reasons so clearly stated by Blume. There is no alternative but to accept Blume's earlier spelling of the name.

Beilschmiedia Nees

Beilschmiedia Fordii Dunn in Jour. Bot. 45: 404. 1907; Chun in Contr. Biol. Lab. Sci. Soc. China 15: 9. 1925; Liou, Laurac. Chine Indoch. 105. 1932.

HONGKONG: *Ford* (fragm. type, AA); *W.J.T.* (*Hongkong Herb. No. 9051?*) (AA); *W.J.T.* (*Hongkong Herb. No. 5223*) (AA). KWANGTUNG: *Lau* 1980, 2524, 2798 (AA); *To, Tsang & Tsang* 620 (CCC No. 12620) (AA, USDA, USNH); *Tsang* 21128 (USDA), 21130 (AA, NY), 21268 (AA, NY, USDA).

This species is characterized by heavily coriaceous, oblong, shining leaves. I have seen no flowering specimens, but Dunn describes the flowers as occurring in axillary cymes 2-3 cm. long, with thick peduncles

1 cm. long. The smooth, bluish black, ellipsoid fruits, frequently covered with a frosty bloom, are borne on enlarged pedicels in short subterminal or axillary infructescences. *Number 5223* from Happy Valley, the type locality, shows leaves with the nervation obscure on the upper surface, except for the impressed costa, and less so on the lower surface with the costa very prominent.

***Beilschmiedia brevipaniculata*, spec. nov.**

Arbor 3–7 m. alta, ramulis glabris, novellis leviter papillosis, teretibus leviter striatis plus minusve nitidis rubro-brunneis. Folia opposita vel subopposita, lanceolata, 4–8 cm. longa, 1–2.8 cm. lata, coriacea, obtuse subacuminata saepe falcata, basi cuneata, utrinque glabra supra interdum nitida, in sicco brunnescentia, subtus laxe prominenter reticulata, penninervia, nervis lateralibus 4–6 (?) obscuris supra haud conspicuis subtus leviter elevatis, petiolis sat robustis ad 1.5 cm. longis, glabris. Inflorescentia terminalia raro axillaris brevipaniculata plus minusve 1 cm. longa (post anthesin longiora?) glabra, pauciflora, pedunculis 2–3 mm. longis. Flores \pm 1 mm. longi, pallide flavi (fide coll.), glabri, perianthii lobis ovatis \pm 1.7 mm. longis dense glanduloso-punctatis, tubo 0.8 mm. longo, pedicellis 0.5 mm. longis. Fructus nigrescens (fide coll.), in sicco brunnescens, opacus, glaber, dense minute conspicueque tuberculatus, ellipsoideus, apiculatus, 1.7×1.1 cm., calyce plus minusve deciduo reliquo subtentus, pedicellis incrassatis ad 1 cm. longis et 2.5 mm. crassis glabris.

KWANGSI: Shap Man Taai Shan, near Iu Shan Village, southeast of Shang-sze, Kwangtung Border (Shang-sze District) *Tsang* 22418 (TYPE fl., AA) fairly common in thicket on steep rocky slope, June 4, 1933 (tree 3 m., fl. pale yellow); *Tsang* 24350 (fruit, AA), 22402 (AA). HAINAN: *Lau* 27302, 27305, 28227 (AA).

This species is more nearly related to *B. Fordii* Dunn from Hongkong than any other. The upper surface of the leaves is frequently shining and of a thick waxy texture such as is found in *B. Fordii*. The lanceolate leaves of *B. brevipaniculata*, however, are much smaller, not more than 8 cm. in length, the panicle shorter and the fruit tuberculate instead of smooth. Tuberculate fruit is characteristic of *B. Tsangii*, but the more membranous leaves and the very prominently and closely reticulate upper leaf surface easily separate the latter. The new genus *Lauromerrillia*, described later in this paper, has fruit which is tuberculate, although less conspicuously so than that of *B. brevipaniculata*.

***Beilschmiedia laevis*, spec. nov.**

Arbor (7–)10(–15) m. alta, ramulis glabris teretibus striatis, novellis saepe sulcatis, olivaceis robustis. Folia opposita vel subopposita, elliptica vel oblonga, ad 10(–11) cm. longa, 4–6 cm. lata, percoriacea, breviter obtuse acuminata, basi acuta, sat undulata, utrinque glabra, supra nitida, in sicco castanea, supra laxe crasseque subtus graciliter reticulata, penninervia, nervis ad 6 utrinque leviter elevatis, costa supra impressa subtus elevata, petiolis ad 2 cm. longis glabris robustis. Inflorescentia ignota. Infructescencia subterminalis, brevis, glaber, ad 4 cm. longa. Fructus brunnescens, glaber, ellipsoideus, apiculatus, ad 1.7×1.2 cm. (2.5×2 cm.), pedicellis pedunculis confusis incrassatis, ad 2 cm. longis et 4 mm. crassis.

HAINAN: *Liang* 64997 (TYPE fruit, AA; USNH) in shaded forest on mountain side,

Feb. 20, 1934 (tree 10 m. or more high; diam. $2/3$ m.), 62018 (AA, USNH), 62603 (AA), 63377 (AA); *Lau* 3839 (AA); *Wang* 33228 (AA).

This species has been referred to *B. assamica* Meissn. but differs in its proportionately wider, elliptic leaves with longer petioles and the elliptic, very smooth, reddish (in herbarium specimen) fruit. It would seem that a character as consistent as the castaneous color of the leaves on drying and their always undulate margin would have been noted by Meissner had it been apparent in *B. assamica*. With *B. laevis* we are getting on the fringe of the troublesome *B. erythrophloia* Hayata, although the two species could never be confused. Again, there is no flowering specimen available, but the outstanding leaf and fruit characters indicate a new species.

Beilschmiedia yunnanensis Hu in Bull. Fan. Mem. Inst. Biol. 5: 306. 1934.

YUNNAN: *Tsai* 51834 (ISOTYPE fl., AA), 51697, 55013 (AA). TONKIN: *Fenzl* 27 (V).

Beilschmiedia yunnanensis possesses a leaf character unusual for the genus. The leaf surface is alveolate, a much finer condition than is habitually found. The flowers are typical of the genus. As yet, no fruiting material has been noted.

Beilschmiedia robusta, spec. nov.

Arbor 10–15 m. alta, ramulis glabris teretibus striatis griseis, novellis breviter sulcatis rubro-brunnescentibus. Folia opposita vel subopposita, lanceolata vel elliptica ad 10 cm. longa, \pm 4 cm. lata, coriacea, obtusa vel acuta, basi cuneata, utrinque glabra, supra quam subtus sat nitidior, dense minuteque glanduloso-punctata, utrinque supra laxe subtus dense reticulata, penninervia, nervis lateralibus 9–12 supra obscuris subtus leviter conspicuis, petiolis ad 1.5 cm. longis leviter atratis. Inflorescentia axillaris et subterminalis, probabiliter paniculata, brevis, minusquam 2 cm. longa, glabra, pauciflora. Flores ad 3 mm. longi, sparse conspicueque glanduloso-punctati, virides (fide coll.), glabri. perianthii lobis ovatis 1.9 mm. longis. Fructus viridis (fide coll.), in sicco brunnescens et crasse rugosus, glaber, obovoideus vel subturbinate, ad 3×2.5 cm., pedicellis ad 1 cm. longis 5 mm. crassis in sicco ferrugineis et aciculatis glabris.

YUNNAN: You-louh shan, Che-li, *Wang* 78157 (TYPE fl., AA) alt. 1415 m., thickets, Sept. 1936 (10 m. high, dbh. 0.6 m.; flower green), *Wang* 74395, 74491, 74759, 75303, 75363, 76785, 76805, 77074, 77384, 78238 (AA); *Yü* 16505 (fruit, AA), 18159 (AA); *Henry* 12777 (AA).

The specimens cited above have been determined as *B. erythrophloia* Hay. but are easily distinguished from the Formosan species by the more numerous veins, the coarser reticulation on the upper leaf surface, the larger, very fleshy obovoid or subturbinate fruit, and the broader less long-acuminate buds. As far as may be ascertained, *B. erythrophloia* Hay.¹ does not occur in China, although for years it has been credited to Yunnan and Hainan. *Beilschmiedia erythrophloia* has oblong, ovate-

¹ *Beilschmiedia erythrophloia* Hayata, Ic. Pl. Formos. 4: 20. 1914; Chun in Contr. Biol. Lab. Sci. Soc. China 1⁵: 8. 1925; Hu, Wang & Hsia in Bull. Fan Mem. Inst. Bot. 8: 335. 1938.

oblong, ovate-lanceolate, or elliptic, long-petioled leaves up to 9×4.5 cm., according to the description, only slightly obtusely acuminate and prominently but closely reticulate. The fruit is obovoid, 2×1.2 cm., shining, rounded at the apex, obtuse at the base, with the pedicel scarcely enlarged. The specimens so labeled in the herbarium of the Arnold Arboretum differ from the description in having foliose branchlets bearing leaves not more than 6 cm. long, with only the suggestion of an obtuse acumen, a pedicel somewhat enlarged, and fruit rather pointed at the apex. This species has also been confused with *B. assamica* Meissn., from which it is easily separable by the smaller, lanceolate-elliptic leaves, not acuminate, with more obscure and more numerous, less arcuate lateral nerves and by the obovoid subturbinate fruit.

***Beilschmiedia intermedia*, spec. nov.**

Arbor ad 15 m. alta, ramulis glabris teretibus striatis, novellis leviter sulcatis, brunnescentibus saepe mox griseis. Folia opposita vel subopposita, elliptica 8.5 cm. longa, 4 cm. lata, coriacea, obtusa vel obtuse leviter subacuminata, basi cuneata, utrinque glabra, interdum in sicco pallide griseo-viridescens, subtus brunnescentia, utrinque laxe reticulata, penninervia, nervis ± 7 , leviter obscuris, petiolis ad 1.5 cm. longis brunnescentibus glabris. Inflorescentia axillaris, paniculata, brevis, ad 1.5 cm. longa, glabra, pauciflora. Flores ± 2 mm. longi, viridescenti-albi (fide coll.), glabri, perianthii lobis ellipticis 2 mm. longis dense conspiciueque glanduloso-punctatis, marginibus scariosis, pedicellis ad 1.5 mm. longis glabris. Fructus in sicco brunnescens, glaber, minutissime tuberculatus, ellipsoideus, apiculatus, 3×1.5 cm., pedicellis incrassatis ad 1.5 cm. longis 4 mm. crassis, in sicco brunnescentibus aciculatis, glabris.

HAINAN: Yaichow, *Liang* 63217 (TYPE fl., AA) in dense shade in mixed woods, Oct. 14, 1933 (tree 12–15 m., diam. 1.5 m.; fl. green-white; fr. green), *Liang* 63324 (fruit, AA), 63409, 63429 (AA); *Lau* 5072 (AA); *McClure* (CCC No. 8158) (AA, USDA); *Wang* 34330 (AA).

Beilschmiedia intermedia is similar to *B. discolor*, but varies in fruit characters. It is possible that with more available material and closer attention to its collection in the field, this species may prove to be an intergrading form. The fruit is less pointed at the ends, more oblong than ellipsoid, and is borne on pedicels that are much more swollen.

***Beilschmiedia discolor*, spec. nov.**

Arbor (5–)9(–20) m. alta, ramulis glabris, novellis subglaucis teretibus sat striatis brunnescentibus mox griseis. Folia opposita vel subopposita, elliptica vel lanceolato-elliptica, ad 8.5 cm. longa, 3.5 cm. lata, coriacea, obtuse vel obtuse-acuminata, basi cuneata, utrinque glabra, supra lustro-viridis (fide coll.), in sicco plus minusve nitida, pallide griseo-viridescens, subtus brunnescentia, utrinque reticulata, penninervia, nervis lateralibus 6–8, petiolis 1(–1.5) cm. longis glabris brunnescentibus. Inflorescentia ignota. Infructescentia axillaris, paniculata, brevis ad 2 cm. longa, glabra, pauciflora, pedunculis ad 1 cm. longis. Fructus lustro-viridis (fide coll.), in sicco atro-rubescens, glaber, minutissime tuberculatus, anguste ellipsoideus, utrinque sat attenuatus, 1.8×0.8 cm., pedicellis leviter incrassatis ad 7 mm. longis et 2 mm. crassis brunnescentibus glabris.

HAINAN: Po-ting, *How* 73571 (TYPE fruit, AA), alt. 420 m., in forest, Aug. 31, 1935 (tree 9 m. high, bark brown; leaves lustrous green, coriaceous; fruit lustrous green); *How* 73719 (AA); *Lau* 406 (AA, USDA, USNH), 3806 (AA); *Liang* 64084 (AA), 64900, 65055 (AA, USNH), 65158 (AA); *Wang* 33551 (AA, USNH), 36846 (AA).

As mentioned before, the true *B. erythrophloia* Hay. apparently does not occur in China. The species nearest the latter is *B. discolor*, which differs in having pale leaves grey-green above and brownish below on drying. The branchlets are not as leafy as those of the sheets labeled *B. erythrophloia*. The fruit is more pointed at each end and the pedicels are distinctly more thickened than those of the latter.

***Beilschmiedia grandiosa*, spec. nov.**

Arbor ad 25 m. + alta, cortice purpureo-rubro (fide coll.), ramulis glabris teretibus striatis brunnescentibus mox griseis. Folia opposita vel subopposita, elliptica vel lanceolata, 6.5(-10) cm. longa, 2.5(-6) cm. lata, coriacea, obtusa vel obtuse acuminata, cuneata, utrinque glabra supra in sicco interdum nitida, pallide griseo-viridescens, subtus brunnescentia, utrinque reticulata, penninervia, nervis ± 7 , petiolis 1(-1.5) cm. longis glabris brunnescentibus. Inflorescentia ignota. Fructus nigrescens (fide coll.), in sicco brunnescens, glaber, minutissime tuberculatus, ellipsoideus, utrinque leviter attenuatus, apiculatus, 4×2 cm., pedicellis incrassatis ad ± 1 cm. longis et ± 4 mm. crassis brunnescentibus aciculatis glabris.

HAINAN: Yaichow, *Liang* 63142 (TYPE fruit, AA) shaded and mixed forests up mt., Sept. 26, 1933 (tall tree spreading 25 m. plus high, diam. 2-3 m.; bark purple-red; fr. black); *Liang* 63215 (AA, USNH); *How* 73139 (AA); *Lau* 25462 (AA).

The two sheets of *Liang* 63215 have fruit which looks rather abnormal, certainly less symmetrical than that of the type, and more attenuated at the ends. It may be another form of the same complex, or it may be an abnormality due to insect attack. *Beilschmiedia grandiosa* represents the largest fruited group of plants in what may be termed the *B. erythrophloia*-complex in China. The elliptic or lanceolate, coriaceous leaves are often up to 11 cm. in length. The minutely tuberculate fruits are ellipsoid, up to 4×2 cm., and are borne on enlarged pedicels up to 6 mm. in diameter.

These last three proposed species are difficult to separate from one another, all having similar characteristics generally and the same loose reticulation apparent on both surfaces of the leaves. The season of collection seemingly means little, for with the exception of *B. intermedia*, of which we have specimens only from October through December, fruit seems to have been collected in nearly every month of the year.

***Beilschmiedia pergamentacea*, spec. nov.**

Arbor 8-14 m. alta, ramulis glabris minute glandulosis teretibus striatis cicatricosis, sat atro-rubrescentibus. Folia opposita vel subopposita, lanceolata, (6-)11-15(-17) cm. longa, (1.5-)3(-4) cm. lata, pergamentacea, acuminata vel obtuse acuminata, basi attenuate cuneata, utrinque glabra, in sicco supra pallida, griseo-viridescens, subtus viridescens, clarior, minute dense glanduloso-punctata, supra obscure subtus conspicuore reticulata, penninervia, nervis 8-12, supra leviter elevatis sat obscuris subtus et costa elevatis rubrescentibus, petiolis ad 2 cm. longis glabris atro-rubrescentibus.

Inflorescentia ignota. Infructescentia axillaris, robusta, glabra, ad 10 cm. longa, fructu unico maturante. Fructus nigrescens, glaber, ellipsoideus, mucronulatus, ad 3.5×2.3 cm., pedicellis pedunculis confusis incrassatis clavatis striatis brunnescentibus ad 4 cm. longis et summis 6 mm. crassis.

HAINAN: Fan Yah, *Chun & Tso* 44247 (TYPE fruit, AA, USNH), alt. 1220 m., in forested ravine (tree 8 m., diam. 20 cm.); *Chun & Tso* 44015 (AA), 44122 (AA, USNH); *Lau* 26359 (AA); *Tang* 409 (AA).

The species with its lanceolate leaves, somewhat paler above and with venation prominent and reddish below, appears to be near *B. Poilanei* Liou from Indochina. The shorter inflorescence, with peduncle and pedicel merging into a robust clavate structure subtending the smooth ellipsoid fruit, separates it from the latter. These striking characters warrant description on fruiting specimens alone.

***Beilschmiedia longepetiolata*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus striatis fulvo-brunnescentibus mox atratis vel griseis maculatis. Folia opposita vel alternata, lanceolata, elliptica vel oblanceolata, anguste obovata, (3-)6-12 cm. longa, (1.2-)3-4(-5) cm. lata, percoriacea, rotundata, saepe obtusa, basi attenuata cuneata, saepe undulata, utrinque glabra, supra nitida, subtus pallida, utrinque laxe, crasse prominenterque reticulata, penninervia, nervis lateralibus ± 6 utrinque elevatis, costa supra leviter subtus prominenter elevata, petiolis 1.5-2.5 cm. longis glabris supra planis. Inflorescentia subterminalis paniculata, ad 3 cm. longa, glabra, pauciflora, pedunculis ad 1.5 cm. longis nigrescentibus. Flores ± 3.5 mm. longi, albo-flavi (fide coll.), glabri, perianthii lobis ellipticis ± 2.5 mm. longis prominenter glanduloso-punctatis ciliolatis, pedicellis ad 5 mm. longis glabris. Fructus atro-virens (fide coll.), in sicco atratus, glaber, in sicco minute rugosus, ellipsoideus, 3×2 cm., pedicello incrassato ad 8 mm. longo, basi 4 apice 6 mm. crasso atrato glabro.

HAINAN: *Wang* 34640 (TYPE fl., AA) in mixed woods, Oct. 16, 1933 (tree 20 m. high; fl. white-yellow), *How* 71018 (fruit AA, USNH).

Wang 34640 at one time was pronounced to be a flowering specimen of *B. obovalifolia* Lte. from Indochina, but it differs from the description of that species in the following characters: the branchlets are pale reddish brown, later becoming greyish or darkened by reddish black blotches; the leaves are larger with nerves almost obscured by the very coarse, loose, prominent reticulation above and below; the petiole is not less than 1.5 cm. long and flat above. The fruit of *B. longepetiolata* is much larger, not obovoid as far as can be ascertained from the one crushed fruit on the specimen, and borne on a pedicel decidedly enlarged. There is no doubt, however, that the species is very close to *B. obovalifolia*. Another relative is *B. percoriacea* which differs in having reddish black young branchlets, larger leaves, shortly, obtusely acuminate, proportionately broader, more numerous, arcuate lateral nerves, blackish petioles, and ellipsoid fruit, 4.5×1.5 cm.

***Beilschmiedia percoriacea*, spec. nov.**

Arbor, ramulis glabris teretibus ad nodos leviter complanatis striatis atrobrescentibus mox griseis. Folia opposita vel alternata, oblonga vel elliptica,

(9–)15 cm. longa, 4.5–6 cm. lata, percoriacea, breviter obtuse acuminata, basi cuneata, undulata, utrinque glabra, supra nitida, glanduloso-punctata, utrinque reticulata, penninervia, nervis 6–8 utrinque elevatis supra quam subtus conspicuioribus, costa supra leviter impressa subtus elevata, petiolis robustis ad 2 cm. longis sat canaliculatis glabris atratis. Inflorescentia ignota. Infructescentia axillaris, ad 4.5 cm. longa, glabra. Fructus lucido-viridis (fide coll.), in sicco nigrescens, laevis, ellipsoideus, saepe obliqua, ad 4.5×1.5 cm., pedicellis incrassatis ad 5 mm. longis et 4 mm. crassis glabris.

HAINAN: Po-ting, *How* 72964 (TYPE, young fruit, AA) alt. 840 m., in forest, June 21, 1935 (tree 7 m., bark brown; leaf deep green above, pale beneath, lustrous, coriaceous; fruit lustrous green); *How* 73523 (more mature fruit, AA); *Lau* 3612 (AA); *Liang* 63115 (AA). KWANGSI: *Ching* 8286 (V).

This species has the heavily coriaceous leaves of *B. longepetiolata* from Hainan but differs as has been noted under the latter. It is this leaf character which separates *B. percoriacea* from *B. Roxburghiana* Nees as well. Although no flowers are available, the leaf and fruit characters of the species seem to be sufficiently outstanding to warrant description. Possibly here belongs *Ford* 4 from Hongkong, Victoria Peak, 15 Aug. 1881, which has been referred to *B. jagifolia* Nees from Sylhet. Only a scanty leaf fragment is at hand, but it is probable that this is the proper identification. The species *B. jagifolia* has also been referred to *B. Roxburghiana* Nees. Liou separates *B. jagifolia* in his key on the smaller size of the leaf and the presence of a less stout petiole.

Beilschmiedia Roxburghiana Nees in Wallich, Pl. As. Rar. **2**: 69. 1831; Chun in Contr. Biol. Lab. Sci. Soc. China **1**⁵: 8. 1925; Liou, Laurac. Chine Indoch. 110. 1932.

HAINAN: *Fung* 20123 (AA, USDA, USNH); *Lau* 3147, 27404 (AA).

These specimens agree fairly well with the description and photograph of the type but are all in fruit. I am inclined to think that a new species may be involved and that the above species does not occur in China. Until flowering specimens are collected, these numbers will be kept under *B. Roxburghiana*.

Beilschmiedia atrata, spec. nov.

Arbor ad 9 m. alta, ramulis glabris plus minusve teretibus striatis atro-rubrescentibus mox griseis. Folia opposita vel subopposita, elliptica, 8–13 cm. longa, 3–5.5 cm. lata, subcoriacea, obtuse acuminata, basi cuneata, margine undulata, utrinque glabra, supra nitida in sicco rubescenti-brunnea, minute glanduloso-punctata, utrinque obscure, laxe graciliterque reticulata, penninervia, nervis 9–11 costaque subtus elevatis, petiolis ad 1.5 cm. longis glabris. Inflorescentia axillaris, paniculata, brevis, ad 3 cm. longa, glabrescens, 5-flora, pedunculis ad 1 cm. longis. Flores 1.5 mm. longi, flavi (fide coll.), glabrescentes, perianthii lobis \pm 2 mm. extus sparse intus dense canescenti-pubescentibus orbicularibus, pedicellis brevibus ad 5 mm. longis. Fructus viridescens (fide coll.), in sicco atro-rubescens, glaber, sat laevis, ellipsoideus, interdum apiculatis, 3×2 cm., pedicellis ad 1 cm. longis et 4–5 mm. crassis glabris.

HAINAN: Hung Mo Shan & vicinity, Lai (Loi) area, *Tsang & Fung* 693 (*L. U.* 18227) (TYPE fl. & fruit, AA; USNH, V), at top of mt. in forest, Aug. 12, 1929 (tree 9 m. high, diam. 12 cm.; fl. yellow; fr. green).

This seems at first to be very near *B. Roxburghiana*, but is separated by the smaller leaves with more obscure reticulation, the absence of a whitish tomentellous condition on the racemes and young branchlets, the elliptic (3×2 cm.) instead of oblong (4×1.5 cm.) fruit. The subcoriaceous leaves as well as the young branchlets of this species in the dried state are blackish red and the leaves are shining above.

Beilschmiedia Wangii, spec. nov.

Arbor ad 7 m. alta, ramulis glabris summis glabrescentibus (probabiliter novellis pubescentibus) teretibus striatis rubro-brunnescentibus mox atrorubrescentibus. Folia oblonga vel oblongo-elliptica, 9(–23) cm. longa, 3.5 (–8) cm. lata, membranacea vel subcoriacea, obtuse subacuminata, basi acuta saepe obliqua, supra glabra, saepe nitida, supra nitida, subtus pubescentia, minute denseque glanduloso-punctata, plus minusve minute papillosa, supra leviter subtus conspicue reticulata, penninervia, nervis ad 9 supra leviter subtus conspicue elevatis, costa supra leviter impressa subtus conspicue elevata, petiolis ad 2.5 cm. longis glabris plus minusve minute papillosis. Inflorescentia axillaris et subterminalis paniculata, ad 6(–10) cm. longa, pubescens, ramulis bracteolis brevibus ± 2.5 mm. longis et ± 1 mm. latis dense ferrugineo-pubescentibus plus minusve obovatis vel lanceolatis subtentis, pedunculis ad 1.5 cm. longis. Flores 4–5 mm. longi, canescenti (fide coll.), pubescentes, perianthii lobis 3.3 mm. longis ellipticis glanduloso-punctatis, pedicellis gracilibus pubescentibus ad 1 cm. longis. Fructus atropurpurascens (fide coll.), in sicco brunnescent, glaber, minutissime tuberculatus, oblongus, apiculatus, 5.5×2.2 cm., pedicellis sat clavatis incrassatis curvatis ad 2.5 cm. longis 5 mm. crassis, atrorubrescentibus striatis glabris.

HAINAN: *Wang* 35745 (TYPE fl., AA), in mixed forest, Dec. 21, 1933 (tree 7 m., fl. white; fr. black); *Lau* 25637 (fruit, AA); 27396, 28280 (AA).

Beilschmiedia Wangii has oblong-elliptic, membranaceous or subcoriaceous, glandular-punctate leaves, minutely papillate on the lower surface and frequently oblique. The delicate reticulation is apparent on both surfaces but less so on the upper. The rather long-pedicelled, loose, large-flowered, axillary or subterminal inflorescences are outstanding because of the persistent somewhat ferrugineous pubescent bracts at the nodes. The flowers appear to be glandular-punctate in an unusual way, the glands appearing as black dots when the epidermis is torn. The slightly curved, almost club-shaped fruiting pedicels bear oblong (5.5×2.2 cm.) dark purple fruit. *Lau* 28280 has more elongate inflorescences, while the leaves of the fruiting specimen, *Lau* 27396, supposedly a shrub, are larger than those of the type and appear to be infected with fungal growth simulating pubescence. Even so, there can hardly be a doubt of their belonging to *B. Wangii*. The species probably belongs in the group with *B. Roxburghiana*, but is separated from it by the persistent floral bracts subtending the branchlets of the panicles.

Beilschmiedia macropoda, spec. nov.

Arbor ad 20 m. alta, ramulis glabris teretibus striatis atrorubrescentibus mox ferrugineo-maculosis. Folia opposita vel alternata, lanceolata vel oblonga (6.5–)9–12 cm. longa, (1.5–)2.5–4 cm. lata, subcoriacea, obtusa

vel obtuse subacuminata, basi cuneata, utrinque glabra, supra nitida, utrinque reticulata, penninervia, nervis ad 10 utrinque obscuris, petiolis sat gracilibus ad 2 cm. longis glabris. Inflorescentia ignota. Infructescentia axillaris, robusta, nunc ad 10 nunc ad 6 cm. longa, glabra, pedunculis robustis basi tumidis. Fructus viridis (fide coll.), in sicco pallide ferrugineus, glaber, sat lepidotus, ellipsoideus, apiculatus, 4.5×3 cm., pedicellis breviter tumidis utrinque 1 cm. pallide ferrugineis glabris, in sicco longitudinaliter rugosis.

HAINAN: *Wang 34535* (TYPE fruit, AA; USNH), in mixed woods, Oct. 8, 1933 (tree 20 m. high; fr. green); *Wang 35098* (AA); *Liang 64329* (AA).

The above species is so striking in its fruiting characters that it is with no hesitation described as new. The large, ellipsoid fruit in dried state is rusty-brown, scaly and greatly wrinkled. The pedicel, which bears the same type of surface, is so swollen and enlarged as to appear to be a part of the fruit proper. The peduncles, whether long or short, are greatly enlarged at the base. From the description of the globular fruit by Liou (p. 106. Laurac. Chine Indoch.) the Indochinese species *B. Balansae* Lctc. seems to have much the same type of surface, but no mention is made of the peculiar formation of the pedicels and peduncles. In any case, the leaves of the latter are elliptic or oval, shorter and broader accordingly and are only 5-6 nerved.

***Beilschmiedia obconica*, spec. nov.**

Arbor ad 25 m. alta, ramulis ferrugineo-tomentosis mox griseo-glabrescentibus teretibus striatis brunnescentibus. Folia opposita vel subopposita, elliptica vel oblongo-elliptica, saepe obliqua, (4-)6-9(-11) cm. longa, (2-)3.5-4(-6) cm. lata, pergamentacea, breviter obtuse acuminata, basi cuneata, subtus glabra, costa excepta, subtus pubescentia, minute glanduloso-punctata, graciliter reticulata, penninervia, nervis 7-11 supra leviter subtus conspicue elevatis arcuatis pallide rubescentibus, petiolis ad 2 cm. longis brunnescentibus. Inflorescentia ignota. Infructescentia brevis ad 4 cm. longa, breviter ferrugineo-pubescentis. Fructus nigrescens, maculosus, pallide brunnescentis, obconicus, minute apiculatus, 12×10 mm., pedicellis incrassatis leviter clavatis ad 8 mm. longis brunnescentibus ferrugineo-pubescentibus.

HAINAN: *Liang 65199* (TYPE fruit, AA; NY, USNH), in shaded forest, along stream margin, Feb. 24, 1934 (tree 25 m. high or more, diam., $2\frac{1}{3}$ m.).

The only other species from eastern Asia with ferruginous pubescence is *B. ferruginea* Liou from Indochina, from which the above species is easily distinguished by the irregular reticulate venation, as opposed to the nearly parallel secondary venation of the latter. The obconical fruit is an unusual feature as well.

***Beilschmiedia Tsangii* Merr. in Lingnan Sci. Jour. 13: 27. 1934.**

KWANGTUNG: *Tsang 20412* (PARATYPE AA; USDA, USNH), 20588 (ISOTYPE AA; USDA), 25201, 25282, 28827 (AA); *Lau 2567* (AA); *Taam 141, 214* (AA); *Tsang & Wong 2490* (CCC 14351), 2642 (CCC 14503) (USDA); *To, Tsang & Tsang 385* (CCC 12385) (USDA, USNH). HAINAN: *Liang 62053, 62575* (AA, NY), 63278 (NY), 63362, 63411, 63417, 63428 (AA, NY). INDOCHINA: *Tsang 27027, 29122, 29916* (AA).

The species, known only from Kwangtung and across the border in

Indochina, belongs in the group with *B. brevipaniculata*, from which it is easily distinguished by larger, less coriaceous, densely reticulate leaves, by longer inflorescences, and by larger fruit more minutely and less obviously tuberculate. Superficially, at least, it bears a resemblance to *Lauromerrillia appendiculata*, the type of the new genus described below, but it is at once distinguished by the floral structure and by the very finely reticulated leaves, the reticulation obscuring the lateral venation on the upper surface. The Liang numbers are in fruit only and, although a Kwangtung-Hainan distribution is unusual, are nevertheless a good match for the species.

Cryptocarya R. Br.

The well known species of *Cryptocarya* from eastern Asia need no special treatment here. *Cryptocarya chinensis* Hemsl. and *C. densiflora* Blume, the only species of this region with trinerviate leaves, are easily distinguished from each other by size of leaves, inflorescence and fruit, which in the former is subglobose and in the latter globose-depressed. *Cryptocarya obtusifolia* Merr. stands out because of large heavily coriaceous, reddish tomentose leaves with numerous (9–11) veins, and long densely tomentose inflorescence. *Cryptocarya Maclurei* Merrill is noted for its dull greenish leaves, conspicuously glaucous below, and spherical fruit.

Cryptocarya hainanensis Merrill in Philip. Jour. Sci. **21**: 343. 1922; Chun in Contr. Biol. Lab. Sci. Soc. China **15**: 5. 1925; Liou, Laurac. Chine Indoch. 100. 1932.

Inflorescentia axillaris, stricte spiciformi-paniculata, ad 8 cm. longa, breviter fulvo-tomentella, pauciflora, pedicellis ad 2.5 cm. longis gracilibus, basi bracteis lanceo-linearibus pubescentibus subtentis. Flores ad 2.5 mm. longi, pubescentes, perianthii lobis extus intusque pubescentibus.

HAINAN: Bak Sa, *Lau* 26133 (fl., AA) in thickets, woods, April 8, 1936 (tree; leaf green above; flowers deep green); *Lau* 26392 (AA); *McClure* 2107 (CCC 8707) (TYPE, fruit, M; NY, USDA); *Tsang & Fung* 630 (*L. U.* 18164) (NY, USNH); *Wang* 34511 (NY, USNH), 34358, 36231 (NY).

Certainly *Lau* 26133 represents the flowers of *C. hainanensis* Merr. The tomentose spicate inflorescence is unusual for the genus but the flower structure is typical.

Cryptocarya concinna Hance in Jour. Bot. **20**: 79. 1882; Chun in Contr. Biol. Lab. Sci. Soc. **15**: 6. 1925; Liou, Laurac. Chine Indoch. 101. 1932.

KWANGTUNG: Buswell, *Levine & Tso* 6380 (M); *Levine* 150 (USDA, USNH), 3172 (USDA, USNH); *Tsang & Wong* 2173 (CCC 14574) (USDA), 2931 (CCC 14792) (USDA); *Liou* 836 (NY); *Ho* 60045 (NY); *Tsang* 25820 (AA). KWANGSI: *Liang* 70067 (AA).

This species has been for years a catch-all for specimens collected anywhere in southern China. Possibly the species is variable enough to include most of these, but many more numbers will have to be collected from intervening areas to make the fact known beyond doubt. At present we have available only the description and early Kwangtung numbers matched by Dr. F. P. Metcalf of Lingnan University with Hance's type, a flowering specimen collected by Ford in Happy Valley, Hongkong, and now in the British Museum. Since all Arnold Arboretum specimens of the genus have

been on loan since 1937, only specimens accessioned after that date are at hand for study.

Of the matching specimens cited above, nearly all have elliptic-oblong or oblong leaves, greyish green on drying, paler glaucous below with reticulation rather prominent, obtuse, subacute or rarely subacuminate, usually not more than 8 cm. long and 3 cm. broad. The fruit is black, oblong, 2×3 cm., smooth at maturity, slightly asymmetrical at base. *Ho 60045* has slightly larger, more symmetrical leaves with obtusely acuminate apices, but the fruits are a match for the others. Here might be mentioned a closely related number, *Fung 20428* from Hainan, in post anthesis stage, with very young fruit, the perianth lobes having fallen. The plant may possibly represent a new species, but it could not be described on such incomplete material, although the densely flowered terminal or subterminal subcorymbose inflorescence is distinct, as also are the elliptical obtuse or rarely subacute leaves $(3-6(-7) \times (2-3)$ cm.

Variation within the species in this complex occurs mostly in leaf form and size. Flowers are usually fairly constant, with little variation in structure. Fruit also is constant within the species. Hence, other characters being equal, a striking difference in fruit structure seems to indicate a good species. Going on this assumption, then, we have recognized as species *C. Chingii* (*C. Laui*) and *C. Metcalfiana* from Kwangtung, Kiangsi, Chekiang, Kwangsi and Hainan, with great vegetative variation but constant fruit and flower characters. We have also *Cryptocarya Tsangii*, *C. Leiana* and *C. Merrilliana* from Hainan, and *C. lenticellata* from Kwangtung, distinct from either of the first two mentioned species in leaf or flower or fruit, but not in all three characters.

Cryptocarya Chingii Cheng in P'ei, in Contr. Biol. Lab. Sci. Soc. **10**: 111, fig. 17. 1936.

Cryptocarya Laui Merr. & Metc. in Lingnan Sci. Jour. **16**: 83, fig. 3. 1937.

KWANGTUNG: *Lau* 922 (fruit, NY); *To, Tsang & Tsang* 12637 & 12793 (TYPES of *C. Laui*, fl., NY, USDA, USNH); *Taam* 149, 166, 180, 302, 392, 397, 958 (AA); *Tso* 20337, 21002, 21168 (NY); *Tsang* 21292 (NY, USDA); *Wang* 2886 (NY). KIANGSI: *Lau* 4029, 4036 (AA, USNH). CHEKIANG: *Ching* 2055 (ISOTYPE of *C. Chingii*, fl. & young fruit, USNH). KWANGSI: ?*Ching* 7039 (NY); *Steward & Cheo* 853, 1154 (NY); *Wang* 40673 (AA). HAINAN: *Liang* 62581, 63146 (NY), 63456 (NY, USNH); *How* 70438 (NY); *Lau* 26313 (AA); *Wang* 34383 (NY).

Although the isotype of *Cryptocarya Chingii* is a poor specimen, it is evident that it can not be separated from the Kwangtung material described as *C. Laui* by Merrill and Metcalf. This species has been determined frequently as *C. concinna* Hance. The *To, Tsang & Tsang* numbers 12637, 12793, type material, present so great a range in leaf variation as to make them appear to be different species. However, a study of other specimens cited above shows a constancy of specific characters of flowers and fruit. The species is characterized by usually oblong (often elliptic on the same branch), obtusely acuminate, subcoriaceous leaves approximately three times as long as broad, slightly shining or dull above, paler below, bringing out the darker venation which is inconspicuous above. The young branchlets and very young leaves are covered with a fine silky pubescence

which disappears early for the most part. The axillary or subterminal, rather dense panicles, shorter than the leaves, are clothed with a close, greyish tan pubescence. Very young fruit is almost spherical but soon assumes the ellipsoid shape characteristic of the full-grown specimen. Immature fruit also has well defined longitudinal striations which disappear as it approaches maturity. Mature fruit is black, approximately $15-17 \times 10-12$ mm., borne on somewhat enlarged verrucose or rimose pedicels.

The Hainan numbers have been included only after careful consideration. Their leaves, on the whole, are more often elliptic than oblong and perhaps less acuminate, but there seem to be no other differences. The flowers are identical. *Lau 26313* and *How 70438* show immature fruits which differ in no way from the fruit from Kwangtung in the same stage of development.

***Cryptocarya Leiana*, spec. nov.**

Arbor ad 5 m. alta, ramulis gracilibus glabris, ultimis minute fulvo-pubescentibus, teretibus striatis olivaceo-brunnescentibus. Folia alternata, lanceolata vel lanceolato-elliptica, raro obovata, (4-)9-14 cm. longa, 1.5-4-5 cm. lata, subcoriacea, acuta, acuminata vel obtuse acuminata, raro retusa, basi cuneata, minute pubescens, mox glabrescens vel glabra, subtus glauca reticulataque, penninervia, nervis ± 5 supra obscuris, costa impressa, subtus elevatis, petiolis 5-10 mm. longis brunneis glabris glandulosis. Inflorescentia subterminalis vel axillaris, racemoso-paniculata, plerumque quam folia brevior, ad 6.5 cm. longa, ramulis gracilibus minute pubescentibus aliquid strictis. Flores ultimi plerumque 3 fulvo-pubescentes, 2-3 mm. longi, flavescentes, fragrantés (fide coll.), sessiles vel brevi pedicellati, perianthii lobis ovatis ± 2 mm. longis intus paullo pubescentibus. Fructus in sicco glauco-purpureo-brunnescentis, glaber, ellipsoideus, apice basique leviter attenuatus, 12×7 mm., apice perianthii tubi reliquis coronatus pedicello leviter crasso situs.

HAINAN: Mei Maan and vicinity (Ching Mai District) Kai Lun Ko, *Lei 17* (TYPE, fl. & fruit, NY; USDA, USNH), rare in thickets on village commons on dry level land in sandy soil, Sept. 25, 1932 (woody, erect 5 m. high, 12 cm. diam.; fl. yellow, fragrant).

The species is distinctive because of the small ellipsoid fruit, never more than 12×8 mm., rough, minutely tuberculate and opaque on the surface with faint costa apparent. Seemingly these fruits are mature, although one should not overlook the possibility that they are not, in which case one might be forced to consider *C. Leiana* as an Hainan form of *C. Chingii*. The leaves are lanceolate-elliptic or oblong-elliptic, often slightly broader in the upper half, with the apex varying from rounded or retuse to obtusely acuminate, 6-13 cm. long, 3-5 cm. broad. The single branch of the type has subterminal or axillary racemose full-flowered panicles at its tip, and below, fruiting panicles bearing presumably mature fruits. The individual flower parts, stamens, etc., are on a larger scale than those of *C. Chingii*. The fruiting pedicels are only slightly swollen as opposed to much enlarged pedicels of *C. Chingii*.

***Cryptocarya Merrilliana*, spec. nov.**

Arbor (vel frutex ad 2 m.) ad 12 m. alta, ramulis ultimis sparse pubescentibus et lenticellatis saepe minute glandulosis rimosis brunnescentibus mox rubescentibus griseis maculosis. Folia alternata elliptica, raro oblongo-

elliptica, 5–12 cm. longa, 2–4 cm. lata, subcoriacea, obtuse subacuminata, basi cuneata, supra glabra, subtus pubescens, junioribus utrinque adpresse sericeo-pubescentibus, utrinque plus minusve obscure reticulata, penninervia, nervis 4–5 subtus quam supra elevatioribus, petiolis ad 1 cm. longis brunnescentibus pubescentibus mox glabris et atratis, plus minusve minute glandulosis. Inflorescentia subterminalis axillarisque, racemoso-paniculata, 3–5 cm. longa, quam foliis brevior, sericeo pallide brunneo-pubescens. Flores = 3 mm. longi perianthii lobis ovatis 1.7 mm. longis intus leviter pubescentibus, pedicellis brevibus pubescentibus. Fructus in sicco olivaceus, glaber, costatus, minute tuberculatus, ellipsoideus, apice perianthii reliquis coronatus, ad 15×9 mm., pedicello crasso ad 2 mm. situs.

HAINAN: Kумын, *Lau 27635* (TYPE fl., AA), in dense woods on slope, Aug. 7, 1936 (erect shrub 2 m., diam. 3 cm.; leaf green above; fruit green); *Lau 26075* (AA); *Chun & Tso 44398* (fruit, NY, USNH), *43887* (NY), *44043* (NY); *Wang 33437* (NY, USNH), *35040* (NY).

This species also is well within the limits of the “concinna” complex, and approaches *C. Chingii* in general characters. It varies in its irregular leaves, usually elliptic and more coriaceous, and in twigs minutely glandular with their pubescence persisting longer. Again, it is possible that this may eventually tie in with a broader concept of the Hainan specimens of *C. Chingii*.

Cryptocarya lenticellata Lecomte in Not. Syst. **2**: 333. 1913; in Fl. Gén. Indoch. **5**: 145. 1914; Liou, Laurac. Chine Indoch. 99. 1932.

KWANGTUNG: *Lau 20219* (AA, NY, USDA, USNH).

The above species has been reduced by Nakai (Jour. Jap. Bot. **16**: 122. 1940) to *C. Konishii* Hayata & Kawakami (List Pl. Formos. 95. 1910). The species seem close, but with only a description and no authentic material from Indochina for comparison I hesitate to accept the reduction, particularly in view of the discrepancy in range. The Lau specimen cited by Nakai is not from the Kwangtung-Tonkin border, but from near the monastery at Ting Woo Shan. For this reason the presence of an Indo-Chinese species is very probable. Although the Lau number cited is similar to the material of *C. Konishii* at hand from Formosa, at the same time it matches well the description of *C. lenticellata*. The fruit of *Lau 20219*, apparently immature, is larger than that of *C. Konishii*, and less broad at the base in proportion to its length. It seems to answer more nearly the description of the fruit of *C. lenticellata*. Certainly the fruits are no match for those seen on the Formosan material from New York or Washington. The pedicels are thickly swollen, which is not the case with those of the latter. Temporarily we will keep *C. lenticellata* a distinct species and consider *Lau 20219* a Kwangtung representative.

Cryptocarya Metcalfiana, spec. nov.

Arbor ad 15 m. alta, ramulis ultimis glabris striatis sparse pubescentibus angulatis brunnescentibus. Folia alternata, lanceolata vel lanceolato-oblonga, (3–)7–8(–10) cm. longa, (1.2–)2.5(–4) cm. lata, coriacea, acuta, obtusa vel breviter obtuse acuminata, basi cuneata saepe obliqua, utrinque glabra, subtus leviter glauca, supra obscure subtus leviter reticulata, penninervia, nervis 5–7, subtus quam supra elevatioribus, petiolis 1–1.5

cm. longis brunnescentibus glabrescentibus. Inflorescentia subterminalis, racemoso-paniculata, densiflora, plerumque quam folia longior, ad 10 cm. longa, ramulis ultimis breviter pallide brunneo-pubescentibus. Flores ultimi 2-3, brunneo-pubescentes, 3 mm. longi, perianthii lobis viridescenti-flavescentibus (fide coll.), extus intusque pubescentibus, pedicellis pubescentibus \pm 1 mm. longis tenuibus. Fructus in sicco olivaceus, immaturus viridis (fide coll.), glaber, obscure costatus, oblongus, apice perianthii reliquis coronatus, ad 17 mm. longus, 10-11 mm. latus, pedicello crasso 2-3 mm. longo situs.

HAINAN: Chim Shan Fan Maan, Ts'uen & vicinity, Ling Shui (Ling-tui) District, *Fung* 20087 (TYPE fl., NY; USDA, USNH), growing in forest and lower slope of the mt. (tree 15 m., diam. 24 cm., flower greenish yellow); *Lau* 1259, 1742 (NY), 5831 (AA), 27399 (AA); *Liang* 63261 (fruit, NY), 62347, 63302, 66049 (NY); *Wang* 33441 (NY).

This species is near *C. concinna*, but differs in having leaves that are on the whole larger and more coriaceous, and inflorescences more densely flowered and longer than the leaves. *Lau* 27399 and *Liang* 66049, in very young fruit, bear leaves more shining and generally longer than those of the type.

***Cryptocarya Howi*, spec. nov.**

Arbor ad 16 m. alta, ramulis teretibus glabris striatis plus minusve pallide viridescenti-brunnescentibus. Folia alternata irregulariter lanceolato-ovata vel ovata vel saepe oblonga, 5-9-12(-14) cm. longa (2-)3(-5.5) cm. lata, coriacea, attenuate, acute vel obtuse acuminata, saepe obliqua et falcata, basi rotundata vel cuneata, glabra subtus conspicue glauca, penninervia, nervis 3-5 supra leviter impressis subtus conspicue elevatis, petiolis ad 1.5 cm. longis crassis glabris brunnescentibus. Inflorescentia subterminalis racemo-paniculata, congestiflora, plerumque quam folia brevior, ad 7 cm. longa, ramulis brunnescentibus pubescentibus mox glabrescentibus. Flores ultimi 2-3, breviter griseo-pubescentes, 2-3.5 mm. longi, flavo-canescens (fide coll.), sessiles vel brevi-pedicellati, perianthii lobis ellipticis \pm 2 mm. extus intusque pubescentibus. Fructus niger (fide coll.), in sicco olivaceo-brunnescens, obtuse 9-costatus, oblique oblongus, apice perianthii reliquis coronatus, ad 2.5 cm. longus, ad 1.2 cm. latus, crasso pedicello situs.

HAINAN: Woods, Yaichow, *How* 70499 (TYPE fl., NY; USNH), alt. 510 m., Mar.-July, 1933 (tree 9 m.; fl. yellowish white); *Wang* 36749 (fruit, NY), 33969 (NY); *How* 70839 (NY); *How & Chun* 70132 (NY, USNH), 63302 (NY).

Cryptocarya Howi is similar to *C. Metcalfiana*, but the leaves are, on the whole, larger and more irregularly lanceolate-ovate or ovate, usually more rounded at the base, and very glaucous beneath, making the darker veins stand out more clearly. The branchlets have a greenish brown tinge. In leaf shape this species resembles *C. Tsangii* as well. The blades are coriaceous, elliptic or usually slightly ovate-elliptic with obtusely subacuminate or obtusely acute apices and with bases rounded to abruptly cuneate. The lower surface is glaucous at first, later more or less concolorous. The midrib is slightly impressed above and strongly elevated below. The lateral veins, 4-5 pairs, spread upward, arching slightly toward the margin, and are inconspicuous on the upper and elevated on the lower surface. The reticulations are more apparent on the lower surface.

The petioles are 1.5 cm. long. The inflorescences are 5–10 cm. longer than the leaves. The mature fruits are long-ellipsoid, black and faintly striate, 2.5×1.2 cm. These specimens, heretofore placed under *C. concinna*, are a far cry from the original description of that species and from the presumably authentic specimens indicated by Metcalf as a match for the type at British Museum.

HAINAN: *Tang* 423 (AA); *Lau* 1456 (NY); *Liang* 64204 (NY).

The above numbers from Hainan can be separated from *C. Howi* only by their stouter, dark brown branchlets and larger, more coriaceous leaves (15×5.5 cm. with petioles up to 2 cm. long). The branchlets of the inflorescence also are stouter. Lau's field label for the flowering specimen says "rare," so perhaps we have another species. Nevertheless, the congested inflorescence, the long oblong fruit and the leaf shape present similar characters to those of the type.

Cryptocarya Tsangii Nakai, Jour. Jap. Bot. **16**: 121. 1940.

HAINAN: *Tsang & Fung* 688 (L. U. 18222) (ISOTYPE, NY, USNH).

No flowering material of this species is available. From the fruiting branchlets it is apparent that a separate entity is involved. The heavily coriaceous leaves are bright brown, very shining above, dull below with the venation elevated and more apparent, and are borne on rubescent petioles. The young twigs are more or less rubescent and frequently covered with paler lenticels. The black fruit is ellipsoid, often with a very slight tendency to be obovoid, longitudinally striate, minutely tuberculate. It is a question again if this may not represent a form of *C. Metcalfiana*. It is certainly very close.

Cryptocarya annamensis, spec. nov.

Arbor 10(–20) m. alta, ramulis teretibus striatis nigro-rubrescentibus, ultimis ferrugineo-pubescentibus mox glabrescentibus, ad nodos complanatis. Folia alternata, oblonga vel elliptica, raro late elliptica, (6–)8–9 cm. longa, (2.5–)3(–4.5) cm. lata, coriacea, obtuse acuminata, vel obtuse acuta, basi rotundata vel obtusa, saepe obliqua, utrinque glabra, subtus glauca, supra leviter subtus conspicue reticulata, penninervia, nervis 4 supra plerumque obscuris subtus elevatis ferrugineo-pubescentibus mox glabris, petiolis 1–1.5 cm. longis probabiliter ferrugineo-pubescentibus mox griseo-pubescentibus demum glabrescentibus vel glabris. Inflorescentia axillaris et subterminalis, saepe foliosa cymoso-paniculata, quam folia brevior ad 4 cm. longa, ramulis breviter ferrugineo-tomentosis. Flores plerumque 3, intus extusque dense fulvo-pubescentes, 3 mm. longi, sessiles vel breve pedicellati, perianthii lobis ovatis 2 mm. longis. Fructus in sicco nigrescens, glaber, late subfusiformis, apice perianthii tubi reliquis coronatus, 8–10 mm. longus, ad 5 mm. latus pedicello aliquid crassato cicatricoso situs.

FRENCH INDO-CHINA: Annam: Station Agricole de Blao pro: du Haut Donai, *Poilane* 22294 (TYPE, P) alt. 800 m., April 12, 1933 (arbre de 10 m. de h. et de 0.40 m. diam., fl. non ecloses et fruits forêt); 21763 (P).

This species falls in Liou's¹ key in the section "fruit ovoid-oblong, not

¹ Liou, Laurac. Chine Indoch. 96. 1932.

longitudinally costate, with greyish inflorescences." Lecomte² mentions no species with leaves less than 10 cm. long except *C. lenticellata* Lctc., which bears costate fruit. The nearest relative of *C. annamensis* is *C. ferrea* Blume from Malaya, reported by Lecomte (l. c. 147) and Liou (l. c. 101) as occurring in Cambodia, Cochinchina and Laos. *Cryptocarya annamensis* has elliptic or elliptic-oblong leaves, obtusely acuminate to obtuse, glaucous below, 7–10 (–13) cm. long, 3–4 (–5.5) cm. broad. The lateral nerves number 4 or 5, whereas those of *C. ferrea* are 8 or 9 (–12–14). The petiole is 10–15 mm. long as opposed to 5–10 mm. long in *C. ferrea*. The inflorescence is up to 9 cm. long and densely flowered. The very young branchlets are rusty tomentose, soon becoming darkly short-pubescent, and finally glabrous and black. The fruits are small, black, ellipsoid, up to 10 m., attenuate at both ends (subfusiform). The last cited number has larger leaves but belongs to this species.

Lauromerrillia, gen. nov.

Arbores. Folia opposita vel alternata, simplicia, penninervia. Ramuli plus minusve robusti, plus minusve angulati. Inflorescentiae axillares, paniculatae, exinvolucratae. Flores hermaphroditi: perianthii lobis 6, aequales tubum brevem, connati cum appendiculis glandulosis alternantes, brevibus flabelliformibus, stamina 6, introrsi, lobis oppositi, antheris 2-loculatis, staminodii 3, lobis exterioribus oppositi, 1–∞ forma magnitudine valde ludentibus quam caeteris minoribus; ovarium subglobosum stylo sat gracile.

Lauromerrillia appendiculata, spec. nov.

Arbor (4–)6–10(–20) m. alta, ramulis glabris, novellis plus minusve pubescentibus, teretibus inaequaliter striatis griseis robustis. Folia opposita vel alternata, elliptica vel obovalia, 4.5–10 cm. longa, 2–3.5 cm. lata, membranacea vel interdum subcoriacea, obtusa, obtuse acuminata, rotundata vel retusa, basi cuneata saepe attenuata, utrinque glabra, supra interdum nitida, in sicco viridescens, minute denseque glanduloso-punctata, graciliter prominenterque reticulata, penninervia, nervis lateralibus 7–9 obscuris gracilibus, costa supra leviter subtus prominenter elevata, petiolis ad 1 cm. longis glabris. Inflorescentia axillaris, paniculata, brevis, ad 2 cm. longa, pubescens, 12-flora, pedunculis 5–8 mm. longis. Flores ± 4 mm. longi, flavi (fide coll.), pubescentes, perianthii lobis 6, ± 3 mm. longis elliptico-lanceolatis membranaceis glanduloso-punctatis, tubo ± 1 mm., staminibus 6 lobis oppositis, staminodii 3 triangularibus lobis exterioribus oppositis, 1–∞ forma magnitudine valde ludentibus quam caeteris minoribus, ovarium subglobosum, stylo sat gracile, pedicellis gracilibus pubescentibus. Fructus immaturus viridis vel nigrescens, maturus caeruleus (fide coll.), lividus, glaber, consperse minuteque tuberculatus, obovoideus, immaturus apiculatus, 1.8 × 1 cm., pedicellis sat incrassatis ad 4 mm. longis 1.5 crassis nigrescentibus glabris.

HAINAN: Chim Fung Mt., near Fong Ngau Po Village, Kan-en District, *Lau* 5434 (TYPE fl., AA), fairly common dry steep slope, sandy soil, forest, Feb. 1–28, 1935 (erect tree 9 m. high, diam. 15 cm.; flower yellow); *Lei* 818 (fruit AA, USDA, USNH); *How* 70781, (AA, USNH), 73064 (AA); *Lau* 6 (AA, USDA, USNH), 1268, 1352, 1587, 1662, 1830, 3401, 3535, 3662, 26470 (AA).

² Lctc., Fl. Gén Indoch. 5: 144. 1914.

This species is similar superficially to those in the group with *Beilschmiedia erythrophloia*, but differs sharply in its minutely tuberculate fruit with a definitely obovoid rather than ellipsoid tendency, apiculate only in the young stage, and seated on a somewhat enlarged pedicel. The largest fruits and presumably the most mature are described as blue, whereas the smaller are green or black. The leaves are membranaceous with the lateral veins almost completely obscured by the delicate, loose, raised reticulation. The greenish twigs are unevenly and coarsely striate. The flowers are rather large, 4 mm. in length, and campanulate, with six membranaceous lobes opposite which are six large stamens over 2 mm. long. The introrse anthers possess two large pores and are borne on slender filaments. In the sinus of each lobe is a small flabelliform sessile staminodium or gland. Opposite the three exterior perianth lobes are triangular, shortly stipitate staminodia. Scattered helter-skelter below, around the tube, are a few variously shaped staminodia, stipitate or sessile. The ovary is subglobose with a somewhat slender style once and a half again as long as the ovary. The flower structure does not conform in parts or number of parts to any known genus of the Lauraceae. Vegetatively the specimens fit very nicely into the genus *Beilschmiedia*. As far as the fruit is concerned, the Hainan material might possibly belong to *Beilschmiedia* or *Endiandra*. It is a question of how much latitude may be permitted when one is dealing with floral structure. In the Hainan genera studied previously (*Cinnamomum*, *Neocinnamomum*, *Litsea*, *Neolitsea*, *Actinodaphne*, and *Lindera*) there has been a remarkable consistency in the floral structure. It is only in *Cryptocarya*, *Beilschmiedia*, and *Endiandra* that a variation in number and structure is apparent.

Prof. I. W. Bailey, of the Biological Laboratories of Harvard, very kindly examined the type and pronounced it to be lauraceous in respect to the anatomy of its pollen, leaves and stem. He also states: "The six organs which alternate with the lobes of the perianth differ somewhat in form from the three staminodia but are of fundamentally similar structure. In other words, they appear to me to resemble structures that have been interpreted as staminodia in the flowers of other Lauraceae."

The genus is named in honor of Dr. E. D. Merrill, Director of the Arnold Arboretum, whose work on the flora of Hainan is outstanding.

Endiandra R. Br.

Endiandra hainanensis Merr. & Metc., spec. nov.

Arbor ad 8 m. alta, ramulis glabris, novellis pubescentibus, minutissime glandulosis teretibus, novellis sat angulatis, striatis brunnescentibus. Folia alternata, lanceolata vel oblongo-elliptica, ad 15 cm. longa, 5 cm. lata, pergamentacea, obtusa, attenuate obtusa vel obtuse acuminata, basi cuneata, saepe obliqua, utrinque glabra, minute denseque glanduloso-punctata, utrinque dense conspicuissimeque reticulata, penninervia, nervis 6–8 supra inconspicuis subtus leviter elevatis, costa supra sat subtus conspicue elevata, petiolis 1–1.5 cm. longis glabris. Inflorescentia axillaris, paniculata, ad 6 cm. longa, glabrescens, pauciflora, pedunculis ad 1 cm. longis gracilibus

glabrescentibus mox glabris. Flores 3.5 mm. longi, glabri, perianthii lobis ovalis carnosus, staminibus 3, pseudoconnatis. Fructus in sicco purpureo-brunnescentis, inconspicue costatus, glaber, attenuate oblongus, apice obtusus, ad 3.8×1.4 cm., pedicellis incrassatis ad 5 mm. longis 2 mm. crassis griseis vel atro-rubrescentibus glabris.

HAINAN: Po-ting, *How* 72977 (TYPE fl., AA), alt. 330 m., in forested ravine, June 24, 1935 (tree 8 m., bark grey; leaf lustrous green above, paler beneath; flower pale yellow, anthers opening by valve, slightly fragrant); *Lei* 46 (fruit, AA).

The new species from China is near *E. coriacea* Merr. from the Philippines and an apparently unpublished species from Formosa, but differs from the former in having thinner leaves and longer, attenuated fruit with shorter, less enlarged pedicels, smaller flowers, and inflorescences not ferrugineous tomentose. From the latter it differs in leaves more oblong than elliptic, more finely reticulate, and branchlets less robust.

Syndiclis Hook. f.

Syndiclis chinensis, spec. nov.

Arbor 10(–12) m. alta, ramulis glabrescentibus, novellis ferrugineo-tomentellis, lenticellatis teretibus striatis brunnescentibus. Folia opposita vel alternata, ovata vel elliptica, 6–10 cm. longa, 2.5–5.5 cm. lata, coriacea, acuminata, acuta vel obtusa, saepe obliqua, utrinque glabra vel subtus glabrescentia, novellis subtus pubescentibus?, subtus glauca, minute alveolata, penninervia, nervis 3–5 et costa brunnescentibus, supra impressis subtus elevatis, petiolis ad 1.5 cm. longis brunnescentibus glabrescentibus. Inflorescentia axillaris, paniculata, ad 4 cm. longa, ferrugineo-tomentosa, pauciflora, pedunculis brevibus. Flores 1.5 mm. longi, viridescenti-flavi (fide coll.), ferrugineo-tomentosi, perianthii lobis 4 ovalibus, staminibus 4 paullo exsertis, sessilibus introrsis 2 exterioribus bi-glandularibus, staminodii 4 pubescentibus staminibus oppositis; ovarium ovoideum stylo attenuatum, pedicellis brevibus ad 1.5 mm. longis. Fructus illustre viridis (fide coll.), in sicco atro-rubescens, glaber, turbinatus, cicatrice oblique, 3.5×3 cm., basi 1 cm. crassus, pedicellis pedunculis confusis incrassatis ad 4 cm. longis et 1 cm. latis ferrugineis striatis glabris.

HAINAN: Po-ting, *How* 73136 (TYPE fl., fruit, AA), alt. 480 m. in forested ravine, July 8, 1935 (tree 10 m. high, bark brown; leaf lustrous green above, paler beneath, coriaceous; flower greenish yellow; fruit lustrous green); *Wang* 34657 (AA).

The genus was set up in 1886 by Hooker f., *Icones* **16**: 1516. 1886, and *Fl. Brit. Ind.* **5**: 127. 1886, from Booth's flowering specimen from Bhotan, Himalaya. The name *Syndiclis* refers to the single valve of the anther, doubtless presumed to have been formed by the fusion of the usual two. This characteristic, plus the four perianth lobes and stamens, was the basis of separating it from *Endiandra*. *Syndiclis chinensis* differs from *S. paradoxa* Hook. f., from India in having the young branchlets ferruginous tomentose instead of white or pubescent, leaves 3–4 inches long and $2-2\frac{1}{2}$ inches wide with usually 4 pairs of veins instead of 4–5 inches by $1-1\frac{1}{2}$ inches with 10–12 pairs of veins, the inflorescence ferruginous tomentose (there is no mention of this condition in *S. paradoxa*), and anthers with two valves instead of one. The fruit of *S. paradoxa* is unknown. Koster-mans, *Not. Syst.* **8**: 73. 1939, has discussed the relationship of *Syndiclis*

to the genus *Potameia* Thouars from Madagascar. The only difference he finds is the single locule of *Syndiclis paradoxa*, which he contends appears as two before dehiscence, and at dehiscence becomes confluent. Having myself in other genera found various stages of confluence of valves (see Allen, Jour. Arnold Arb. **23**: 149. 1942) I am inclined to agree with Kostermans that this character is insufficient to maintain *Syndiclis* as a distinct genus. The distribution, although unusual, is not entirely unknown. For example, *Erythrophloeum* in the Leguminosae is predominantly African, with one species each from Australia, China and Indo-China. Other genera, such as *Baphia*, also a legume, and *Combretodendron* in the Lecythidaceae, occur in Africa or Madagascar with an isolated species or so in the Philippines or Malaya.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

STUDIES IN THE THEACEAE, XIII
NOTES ON THE MEXICAN AND CENTRAL AMERICAN
SPECIES OF *TERNSTROEMIA*

CLARENCE E. KOBUSKI

THIS presentation of the Mexican and Central American species of the genus *Ternstroemia* is the second portion of a study of the New World species of the genus. The results of the work on the South American species were published in the Journal of the Arnold Arboretum, **23**: 298–343, 1942, and a study of the West Indian species will appear in the near future. Since the species of *Ternstroemia* in the Western Hemisphere are generally quite localized, one may roughly divide them into three geographical groups for study, namely, those of (1) the West Indies, (2) Mexico and Central America, and (3) South America. The North American groups were taken up first. After a very discouraging attempt at classification, the Mexican and Central American species were temporarily laid aside and the South American species studied instead. This proved to be a very fortunate move because, although many more species had been described and recognized in South America, these latter species exhibited characters which were more clearly distinct and consistent for specific delimitation. This knowledge aided considerably in the later classification of the Mexican and Central American species, many of which were described and based upon a single, extremely variable character. In fact, in contrast with the species of South America, there is throughout all the species of Mexico and Central America a certain sameness in the characters which might be used for specific delimitation.

This leads one to believe that the center of distribution for the genus in the Western Hemisphere lies in northern South America, where there is an abundance of very different species, and that all the Central American and Mexican species are very closely related and probably are derived from the same, not too remote, prototype. This latter assumption may be applied, for the most part, to the West Indian species also. However, there are more true species with definite outstanding characters in the West Indies than in Central America.

In most cases, throughout the genus, the species are rather localized, being confined to small but definite geographical localities. At the northern limits of the range are found two very variable species. In Mexico and Central America there is *T. Tepezapote* Schlecht. & Cham., ranging from southern Mexico into Nicaragua. Although several species have been described as differing from this original form, few present characteristics sufficiently distinct to permit specific recognition. The same holds true for *T. peduncularis* DC. in Cuba and southward through the West Indies. This latter species is better known under the name *T. obovalis* Rich., which

name one would naturally prefer retaining. However, *T. peduncularis*, although previously not well known, was described twenty-three years prior to *T. obovalis*.

Since a formal description was presented in the early part of the South American treatment, it hardly seems worthy of repetition here. However, immediately below is a brief discussion of the various characters used in specific delimitation throughout the genus. The differences which aided so much in the work on the South American species are shown. At the same time, the sameness of characters in the North American species is brought out. This "sameness" or lack of characters led to the assumption that these latter species had been derived from a single very recent prototype.

Leaves: In general, throughout the whole genus *Ternstroemia*, the leaves seldom furnish sound specific characters. The phrase "leaves coriaceous, obovate, crowded at the apex of the branchlets" may be applied to most species. From this characterization there is little variation to be found in the North American species. In one species, *T. sylvatica* (Vera Cruz), the leaves are definitely chartaceous or submembranaceous, and distinctly acute at the apex. A second species, *T. Pringlei* (Southern Mexico), has leaves which are always spatulate and consistently rounded at the apex.

Pedicels: The pedicel length, unless either very short (0.5 mm. or less) or very long (4–8 cm.) is hardly to be used as a distinctive specific character. Occasionally, on the large-fruited species of South America and Polynesia, the pedicels may be very stout (5 mm. diameter) at the apex, but ordinarily they scarcely exceed 2 mm. in diameter. In some instances, the pedicels may be somewhat flattened. This again is a rather inconsistent feature.

Bracteoles: The bracteoles, two in number (rarely four), often present good delimiting characters. They are always unequal in size, generally opposite and situated on the pedicel immediately below the calyx-lobes. In rare instances they may be alternate, with the outer bracteole two or even four millimeters below the calyx-lobes. Frequently the bracteoles appear to be caducous. Neither this latter character nor the alternate position of the bracteoles are consistent. At times, especially in the Mexican species, both alternate and opposite bracteoles with their corresponding positions may be found on a single specimen. In size and shape the bracteoles vary more, perhaps, than in any other individual character. An excellent example of this variation within a single species may be found in *T. Tepezapote*, native of Mexico and Central America. Variations from minute deltoid bracteoles through larger ovate and broadly ovate ones to even larger subrotund forms may be found. Nearly always, the bracteoles are glandular-denticulate. Often, in the very small forms, only a single denticulation may be found.

Calyx: The calyx-lobes, always persistent, offer one of the best and most used characters for differentiation. In the South American species many

different forms, including variations in size, shape, texture and the presence or absence of glandular-denticulations are used to complete satisfaction. In all species, the calyx-lobes are unequal, varying in size and shape from the smaller outer lobes to the larger inner lobes. Glandular denticulations are found only on the two outer lobes and occasionally on the exterior side of the middle lobe. The two inner lobes possess an entire and usually more scarious margin than the outer lobes. In the Mexican and Central American species, little variation is found in this character. All are of the same form and texture, usually rounded with little variation at the apex. Frequently the innermost lobes may be slightly apiculate.

Corolla: The petals, so often absent in herbarium specimens, cannot be relied upon for specific delimitation. They are usually about the same length as the calyx-lobes. Ordinarily they are white or yellowish white in color. A distinct difference in color is found in *T. Standleyana*, where the petals are always pink on the outer surface and red on the inner surface. Urban, in his treatment of the West Indian species, used extensively the character of connation of the base of the petals. In a few of the South American species, especially in *T. globiflora*, where the corolla is nearly cleistogamous, this character is very significant. However, in the Central American and Mexican species, the lobes are usually connate for one-half or a trifle less than one-half their length and vary slightly in this respect.

Stamens: The stamens are usually arranged in two series, only occasionally in one or in more than two series. The filaments are joined together (usually their entire length) and, in turn, are adnate to the base of the corolla. The anthers are usually linear. The connective is projected into an appendage extending beyond the anthers. In the North American species, there is little or no variation in the stamens. In the South American species, the character of the projected connective often presents excellent specific significance.

Pistil: In the pistil occur some of the best delimiting characters. In the South American species and those of the West Indies are found excellent characters for differentiation in the shape and number of cells of the ovary. Two-celled ovaries are the most typical and are present in the majority of species. However, several species in South America and two species in the West Indies have three-celled ovaries. It is interesting to note that the two West Indian species, *T. elliptica* and *T. delicatula*, having three-celled ovaries are confined to the southern islands of the Antilles and that *T. delicatula* is the only species extending into the West Indies from South America. Other species in South America have ovaries with four, five, or even six cells, these conditions usually resulting from incomplete doubling up of the two- or three-celled ovaries. Two species from South America, *T. Gleasoniana* and *T. discoidea*, and one species from the West Indies, *T. parviflora*, have supposedly one-celled ovaries. On the other hand, all the Mexican and Central American species possess two-celled ovaries, and furthermore both cells of the ovary always contain five or six

ovules. In the West Indian and South American species, one finds considerable differences in the number of ovules in the cells of the ovary.

The shape of the ovary and the subsequent shape of the fruit have been misused as characters of separation in the Mexican species. At anthesis, most species have flat, almost umbonate ovaries, seldom over 2 mm. long and up to 5 mm. diameter at the base. This type of ovary develops into a conical fruit. On occasional specimens stages of this development may be observed. It appears as though the apical portion of the ovary develops almost immediately and continues to maturity. In Mexico and Central America, most species have fruit definitely conical in shape, although the degree of angle may vary considerably. Various specimens, such as the type of *T. oocarpa* Rose, have very pronounced conical fruit when compared with the majority of other specimens. However, to my mind, the degree of variation in the fruit of *T. Tepezapote* is so gradual and still so extensive that *T. oocarpa*, although very distinctive in the type, must be included under the binomial *T. Tepezapote*, at least from this characteristic.

The style and stigma in the Mexican and Central American species offer no variations in form or size. In all specimens examined, the style is entire, 4-8 mm. long, and the stigma is punctiform. In the other two geographic regions, the style may be consistently very short (1 mm. in *T. brevistyla* Kobuski and *T. Mutisiana* Kobuski) or very long (10 mm. in *T. dura* Gleason and *T. olacifolia* Wawra); occasionally it may be two-parted, as in *T. tristyla* Gleason, *T. distyla* Kobuski and *T. grandiosa* Kobuski, or three-parted, as in *T. punctata* Swartz. Excellent characters were found in the stigma. Besides the punctiform type, peltate, bi-peltate, crenate and capitate stigmas were found to aid in specific differentiation.

KEY TO THE SPECIES

A. Outer calyx-lobes entire, eglandular.

B. Leaves not retuse at apex, inconspicuously veined on upper surface or slightly elevated, not impressed.

C. Pedicels 3-6 cm. long, sturdy, 3 mm. diam. at apex; bracteoles alternately disposed on pedicel (Maria Madre Island).....1. *T. Maltbyi*.

CC. Pedicels not over 3 cm. long; bracteoles opposite, just below calyx-lobes.

D. Petals red on internal surface, pink on external surface (Costa Rica)....
.....2. *T. Standleyana*.

DD. Petals white or creamy white.

E. Leaves spatulate, rounded at apex, two or three times longer than broad, long-tapering from middle to base; bracteoles generally caducous (Mexico).....3. *T. Pringlei*.

EE. Leaves obovate, often oblong-obovate, obtuse at apex, occasionally bluntly acuminate, tapering from middle but not gradually; bracteoles persistent (Panama).....4. *T. Seemanni*.

BB. Leaves retuse at apex, with veins impressed on upper surface.

C. Leaves oblong-obovate, 5.5-9.5 cm. long, 1.5-2.0 cm. wide, obtuse or acute at apex, tapering at base; veins lightly impressed above (Chiapas).....
.....5. *T. chalicophila*.

CC. Leaves rounded to obovate, 2.5-6.5 cm. long, 1.5-3.0 cm. wide, rounded or obtuse at apex, broadly cuneate at base; veins deeply impressed above, as if etched (see also AA) (Chiapas).....6. *T. impressa*.

AA. Outer calyx-lobes glandular-denticulate.

B. Veins deeply impressed, as if etched, on the upper surface of the leaves (See also A) (Chiapas).....6. *T. impressa*.

BB. Veins inconspicuous or lightly raised on upper leaf surface.

C. Leaves elliptic, acuminate, chartaceous; pedicels short, less than 1 cm. long (Mexico).....7. *T. sylvatica*.

CC. Leaves obovate, coriaceous; pedicels 1.0–2.5 cm. long.

D. Larger bracteoles orbicular, 5–6 mm. long, 4–5 mm. wide; calyx-lobes 10–11 mm. long, ca. 11 mm. wide; petals 11–12 mm. long, 7–10 mm. wide (Honduras).....8. *T. megaloptycha*.

DD. Bracteoles seldom more than 4 mm. long and 3 mm. wide; calyx-lobes not over 8–9 mm. long and 6–8 mm. wide; petals ca. 8 mm. long and 4 mm. wide (Mexico, Guatemala, British Honduras, Honduras, Salvador, Nicaragua).....9. *T. Tepezapote*.

1. ***Ternstroemia Maltbyi*** Rose in North Amer. Fauna, **14**: 78. 1899, as "*T. Maltbya*." *Taonabo Maltbyi* Rose in Contrib. U. S. Nat. Herb. **8**: 322. 1905.

Ternstroemia Maltbyana Standley in Contrib. U. S. Nat. Herb. **23**: 823. 1923. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo Maltbyana Standley in Contrib. U. S. Nat. Herb. **23**: 823. 1923, in synon.

DISTRIBUTION: Mexico (Maria Madre Island, Sinaloa).

MEXICO: Maria Madre Island, gravelly arroyo, *T. S. Maltby 105* (TYPE, US), May 12, 1897. — Maria Madre Island, *E. W. Nelson 4242* (PARATYPE, US; ISOTYPES, FM, G), May 3–25, 1897. — Sinaloa, near Colomas, *J. N. Rose 1675* (US), July 14, 1897.

Branchlets grayish, verticillate. Leaves coriaceous, oblong-obovate, 5–11 cm. long, 3–5 cm. wide, obtuse or subrotund at apex, tapering at base, granular-punctate on both surfaces, the margin entire, plane, the midrib canaliculate above, the 5–7 pairs of veins rather obscure on both surfaces, the petiole 7–8 mm. long. Pedicel 3–6 cm. long, sturdy, as much as 3 mm. diam. at apex; bracteoles 2, quite equal, long-ovate, ca. 2 mm. long, 1.5 mm. wide, apiculate, subcarinate, the margin sharply glandular-denticulate, alternately disposed on the pedicel 4–5 mm. below calyx-lobes, generally caducous; calyx-lobes imbricate, pergamentaceous, subequal, the outer lobes quite rounded, ca. 9 mm. long and wide, the margin entire and scarious, the inner lobes broadly ovate or elliptic, ca. 9 mm. long and 7 mm. wide; petals ovate, 10–11 mm. long, 5–6 mm. wide, involute toward apex, joined at base for 4 mm.; stamens ca. 60, bi-seriate, 5 and 7 mm. long, the filaments 1.5–2.0 and 3 + mm. long, the shorter filaments crassate, the longer filaments linear, the anthers in both ca. 3 + mm. long and the connective projected about 1 mm.; ovary conical, ca. 5 mm. long and 5 mm. diam. at base, 2-celled with 5 ovules in each cell, the style 8 mm. long, the stigma punctiform. Fruit (probably immature) oval to rounded, 2 cm. long and 2 cm. diam., the seeds 10 mm. long and 6 mm. wide.

Distinguishing features of this species are the long pedicels (up to 6 cm.), the large, round, entire calyx-lobes and the large petals. Also the caducous bracteoles, consistently alternate on the pedicel, are unusual.

Rose, in his original description (1899), used the name *Ternstroemia Maltbya* for this species. In 1905, he made the new combination *Taonabo Maltbyi*, correcting the original spelling in both the species and the synonym, *Ternstroemia Maltbyi*. Standley (1923), assuming that Rose originally intended to use the name *Ternstroemia Maltbyana*, made this new combination and for the synonym made still another combination, *Taonabo*

Maltbyana. However, since Rose himself corrected the original spelling "Maltbya," which was grammatically incorrect, to "Maltbyi" in both the species and the synonym, one must accept the name and assume that, even though no actual reference was made to the change, the author intended it so.

2. *Ternstroemia Standleyana*, sp. nov.

Frutex vel arbor parva, 3–6 metralis, ramulis verticillatis teretibus griseis. Folia chartacea vel subcoriacea, obovata vel oblanceolata, 7.5 cm. \times 3 cm. vel 9 cm. \times 2.5 cm. vel 6.5 cm. \times 1.5 cm., apice obtusa, abrupte acuta vel acuminata, basi longo-attenuata, margine integerrima, plana vel subrevoluta, costa supra canaliculata, ad apicem evanida, venis undique inconspicuis, petiolis ca. 5 mm. longis. Pedicelli tereti, 1.5–2.3 cm. longi, bracteolis 2 inaequalibus ovatis 4.0 mm. \times 3.5 mm. vel 3.5 mm. \times 2.5 mm. vel 3.0 mm. \times 2.5 mm. integerrimis subcarinatis; sepala 5, imbricata, subaequalia, ovata, 9.5–10 cm. longa, exterioribus 5–6 mm. latis margine integerrimis et scariosis, interioribus 7–8 mm. latis, intimo apice apiculato; petala 5, ovata, extus rosea, intus rubra, ca. 10 mm. longa et 4 mm. lata, basi ad 2–4 mm. connata, apice acuta et involuta; stamina ca. 35, uni-seriata ut videtur, 5–7 mm. longa, filamentis 2.0–2.5 mm. longis, incrassatis, basi connatis et ad corollam adnatis, antheris linearibus vel subsagittatis, luteis, 4.0–4.5 mm. longis, connectivo in apiculum 0.5 mm. longum projecto; ovario late conico, 2 mm. longo et basi 3 mm. diam., 2-loculato, loculis 4–5-ovulatis, stylo ca. 6 mm. longo, stigmatibus punctiformi. Fructus conicus, 2-loculatus, probabiliter immaturus, 2.0 cm. longa, 1 vel 2 cm. lata, seminibus 1–3, grandis 1.2–1.5 cm. longis et 0.8–1.0 cm. diam., testa pallide lutea, arillo detergibili rubro-brunneo subcarnosa sub lente papillato induta.

DISTRIBUTION: Costa Rica.

COSTA RICA: Prov. Cartago: Alto de La Estrella, bushy slope, *P. C. Standley 39279* (US; fragm. FM), March 1924 (shrub 3 ft. with green fruit). Prov. San José: Northeast of El Copey, near Laguna de la Escuadra, dense oak and bamboo forest, alt. 2000–2200 m., *P. C. Standley 41914* (US), 41945 (FM, TYPE; US, ISOTYPE), Dec. 16, 1925 (common tree 4–6 m.; petals pink outside, red within; anthers yellow). — Laguna de la Chonta, northeast of Santa Maria de Dota, dense wet forest, alt. 2000–2100 m., *P. C. Standley 42209* (US), 42274 (US; fragm. FM), Dec. 18, 1925 (common tree 4–6 m.; buds pink; petals red within; fruit green). — Near Quebradillas, about 7 km. north of Santa Maria de Dota, moist oak forest, alt. 1800 m., *P. C. Standley 42991* (US), 43041 (US; fragm. FM), Dec. 24, 1925 (shrub or small tree 3.0–4.5 m. high; flowers pink outside, red within).

This excellent new species is characterized by large unequal bracteoles, up to 4 cm. long and 3.5 cm. wide, which are much larger than those of its nearest relative, *T. Seemanni*. The calyx-lobes (nearly 10 mm. long) and petals (also 10 mm. long) are considerably larger than those of *T. Seemanni*. In fact, the flowers of the present species measure over 2 cm. across when expanded. The petals of this species are consistently pink on the outside and red within, as contrasted with the yellowish white petals of *T. Seemanni*. The stamens are uni-seriate (35 in number) and 7.5 mm. long in *T. Standleyana*, while in *T. Seemanni* the stamens are bi-seriate (50+ in number) and much smaller in size. The branchlets on *T. Standleyana* are gray in color while in *T. Seemanni* the branchlets are red.

It is a pleasure to dedicate this species to Mr. Paul C. Standley, Curator of the Herbarium of Field Museum of Natural History, long recognized as an outstanding worker in the Central American flora and an indefatigable collector of tropical plants. This is truly Mr. Standley's species, considering that all six specimens cited above were collected by him.

3. ***Ternstroemia Pringlei*** (Rose) Standley in Publ. Field Mus. Nat. Hist. Bot. Ser. 4: 234. 1929.

Taonabo Pringlei Rose in Contrib. U. S. Nat. Herb. 3: 322. 1905. — Standley in Contrib. U. S. Nat. Herb. 23: 821. 1923.

DISTRIBUTION: Mexico (Morelos, Michoacan, Mexico, Oaxaca).

MEXICO: Morelos: Sierra de Tepoxtlán, alt. 2300 m., *C. G. Pringle* 8013 (TYPE US; isotype, AA, G, Mich, Mo, NY), March 18, 1899 (small tree). — Woodlands about Alarcón Station, alt. 1800 m., *C. G. Pringle* 11932 (FM, G, US), June 17, 1904. — Huitzilás, *E. Lyonnet* 645 (AA, Mo, NY, US), Dec. 1930. — Near El Mirador, on road from Cuernavaca to Mexico, alt. 2200 m., *L. O. Williams* 3819 (G), May 19, 1938 (tree). — Near Cuernavaca, *J. N. Rose & W. Hough* 4406 (US), May, 1899. Michoacan: Vicinity of Morelia, Campanario, alt. 2100 m., *Bro. G. Arsène* 5708 (AA, FM, G, Mo, US), Nov. 17, 1910. — Cerro Azul alt. 2100 m., *Bro. G. Arsène* 2287 (AA, Mo, US), Nov. 4, 1909. — La Huéta, alt. 2200 m., *Bro. G. Arsène* s.n. (FM), Oct. 1910. — Hills of Patzcuaro, alt. 2550 m., *C. G. Pringle* 5353 (G, US), July 29, 1892. — North slope of Mt. Tancitaro, alt. 2300–2750 m., *E. W. Nelson* 6894 (G, US), Feb. 24, 1903 (tree 25–40 ft. with white flowers). Mexico State: Temascaltepec: Las Mesas, Rincón and Cumbre, alt. 2000–2800 m., *G. B. Hinton* 3728 (FM), 5606 (AA, FM, NY), 5914 (AA, FM, NY), Apr. 25, 1933–Apr. 29, 1934 (small tree to 10 m. high; vernacular name, "trompillo"). Oaxaca: Teotepec, alt. 2500 m., *G. B. Hinton* 14239 (NY), May 19, 1939 (tree 10 m. high with white flowers, in oak and pine forest).

Small tree with brownish branchlets. Leaves coriaceous, oblanceolate to oblong-cuneate, 6–9 cm. long, 1–2 (–3) cm. wide, obtuse at apex, long tapering from middle to base, granular-punctate on both surfaces, the margin subserrulate or subentire toward apex, subrevolute and plane toward base, the midrib canaliculate above, elevated below, the veins (5–7 pairs) rather obscure above, when visible elevated, visible below, the petiole 5–10 mm. long. Flowers usually axillary, solitary; pedicel 1.0–2.5 cm. long; bracteoles 2, lanceolate, 3.5–5.0 mm. long, quickly caducous, when present usually opposite and immediately below calyx-lobes, occasionally alternate (in type) with lower bract 2–3 mm. below calyx; calyx-lobes imbricate, subequal, pergamentaceous, the outer lobes broadly ovate, ca. 9 mm. long and broad, the margin entire and scarious, the inner lobes broadly ovate, apiculate; petals white, orbicular or suborbicular, 1.0–1.3 cm. long, 1.0–1.2 cm. wide, free nearly to base (2 mm.), the corolla large (for Mexican species), as much as 2.5 cm. diam.; stamens ca. 60, bi-seriate, 5 and 7 mm. long, the shorter stamens with filaments swollen at base, 2 mm. long, the longer stamens with filaments less swollen, 4 mm. long, the anthers in both series ca. 2 mm. long with the projection 1 mm. long and sharply apiculate; ovary conical, ca. 3 mm. long and 5 mm. diam. at base, 2-celled with ca. 5 ovules in each cell, the style 7 mm. long, the stigma punctiform. Fruit elongate-conical, ca. 1.5 cm. long and 1 cm. diam., the seeds up to 8 mm. long and 5 mm. wide.

The outstanding feature of this species is the shape of its oblanceolate or oblong-cuneate leaves, obtuse or generally rounded at apex, and long tapering at base. The margin of the leaves is usually subserrulate or at

least with some evidence of denticulation. Most closely related is *T. chalicophila* Loesener, which can be separated by having its leaves obovate, hardly oblanceolate, distinctly serrulate, retuse at the apex, and with veins impressed above. The bracteoles in this latter species are smaller (2 mm. long), deltoid and definitely alternate, placed as low as 7 mm. on the pedicel away from the calyx-lobes, which are more rounded and smaller (as are probably the petals). In both species the bracteoles are quickly caducous.

4. *Ternstroemia Seemannii* Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 260. 1862. — Alfara, List Pl. Costa Rica, 11. 1887. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — Standley in Contrib. Arnold Arb. **5**: 107 (Fl. Barro Colorado Isl.). 1933.

Ternstroemia peduncularis Seemann, Bot. Voy. Herald. 87. 1853. — Non *T. peduncularis* DeCandolle.

Mokofua Seemannii (Triana & Planchon) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo Seemannii (Triana & Planchon) Standley in Jour. Washington Acad. Sci. **15**: 459. 1925.

DISTRIBUTION: Panama.

PANAMA: *B. Seemann* 525 (ISOTYPE, G), March 1847. — *Duchassaing s.n.* (ISOTYPE, G). Prov. Colon: Chagres, *A. Fendler* 315 (ISOTYPES, FM, G, Mo, US), March 24, 1850. — Loma de la Gloria, near Fato, in forests, alt. 10–104 m., *H. Pittier* 4079 (NY, US), Aug. 1911. Prov. Coclé: Between Las Margaritas and El Valle, *R. E. Woodson*, *P. H. Allen* & *R. J. Seibert* 1300 (FM, NY), July–Aug. 1938 (tree 15 m.). — Penonome and vicinity, *R. S. Williams* 374 (NY, US), Feb.–March 1908 (tree 20 ft. with yellowish white flowers). Prov. Panamá: Thickets and forests near Arraiján, alt. 15 m., *R. E. Woodson*, *P. H. Allen* & *R. J. Seibert* 1340 (FM, Mo, NY), July 21, 1938 (tree 10 m.). — Arraiján, in dense shade, alt. 50 m., *P. H. Allen* 732 (FM, G, NY), Apr. 11, 1938 (slender tree 10 m.; flowers pale tan). — Juan Diaz, moist woods, *P. C. Standley* 30585 (US), Jan. 11, 1924 (shrub or tree 10–20 ft. with dark green leaves). — Sabanas north of Panama City, *Bro. Paul* 416 (US), in 1934. Barro Colorado Island: West Shore, *C. L. Wilson* 132 (FM), Feb.–March 1931 (medium-sized tree). — Along shore near Zetek House, *R. H. Woodworth* & *P. A. Vestal* 686 (AA, FM), Feb. 24, 1932 (tree). — Along French Canal, *O. Shattuck* 783 (FM), Gross Point, *O. Shattuck* 860 (FM), Pena Blanca Bay, *O. Shattuck* 1092 (FM), shore near Zetek House, *O. Shattuck* 1159 (FM), 1932–1934.

Small tree. Branchlets reddish, terete, quite smooth. Leaves chartaceous to subcoriaceous, oblanceolate or oblong-obovate, 6–11 cm. long, 2–4 cm. wide, obtuse at apex, contracted into an obtuse acumen, long tapering at base, granular-punctate on both surfaces, the margin subcrenulate, plane or subrevolute, the midrib canaliculate above, raised below, the veins generally obscure on both surfaces, occasionally 10–15 pairs lightly raised on both surfaces, the petiole 4–6 mm. long. Pedicel 2–3 cm. long; bracteoles 2, opposite, immediately below the calyx-lobes, unequal, very small, rounded, broadly ovate or ovate, 1.0–2.5 mm. long, 2–3 mm. wide, the margin entire or subentire; calyx-lobes imbricate, suborbicular, the outer lobes 4–7 mm. long, 5–6 mm. wide, the margin scarious, entire or nearly so, not glandular-denticulate, the inner lobes 6–8 mm. long, ca. 6 mm. wide, apiculate at apex; petals ovate, 6–7 mm. long, 2–3 mm. wide, acute at apex, joined for 2–3 mm. at base; stamens ca. 50, bi-seriate, 4–5 mm. long, the filaments ca. 1 mm. long, joined at base and adnate to base of corolla, the anthers narrow-linear, ca. 2 mm. long, the connective projected into an appendage 1.0–1.5 mm. long; ovary umbonate at first, 2 mm. long, 4 mm. diam. at base, 2-celled, each cell about 5-ovulate, the style 4–5 mm. long. Fruit subconical

to conical, ca. 1.5 cm. long, 1.0–1.3 cm. diam. at base; seeds 7–8, red-brown, filling capsule completely, 8–10 mm. long, 5–6 mm. diameter.

This species is characterized by chartaceous or subcoriaceous, oblanceolate leaves, reddish branchlets, entire calyx-lobes, and very minute bracteoles, persistent and opposite.

5. *Ternstroemia chalicophila* Loesener in Bull. Herb. Bois. sér. 2, **3**: 213. 1903. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 143. 1925.

DISTRIBUTION: Mexico (Chiapas).

MEXICO: Chiapas: on calcareous slope above Huitztan, *E. Seler* 2276 (ISOTYPE, G), March 10, 1896.

Branchlets rough, gray-brown. Leaves coriaceous, oblong-obovate, 5.5–9.5 cm. long, 1.5–2.0 cm. wide, obtuse or acute at apex, always retuse, tapering at base, granular-punctate on both surfaces, the margin flat and serrulate toward apex, slightly revolute and entire toward base, the midrib canaliculate above, the veins (5–7 pairs) obscure, impressed above and lightly raised below, the petiole 3–6 mm. long. Flowers axillary, solitary, the pedicel ca. 2 cm. long, thickened near the apex; bracteoles 2, alternate, on pedicel 2–4 (–7) mm. below calyx, deltoid, ca. 2 mm. long, glandular-denticulate, quickly caducous; calyx-lobes imbricate, pergamentaceous, subequal, the outer lobes orbicular, 6–7 mm. long and wide, the margin entire, the inner lobes orbicular, only slightly larger, entire; petals (fide Loesener) oval, joined probably 1–2 mm. at base, 1 cm. diam. at apex; stamens (fide Loesener) 5 and 7–8 mm. long, the filaments thickened at base, the anthers with a deltoid acute projection; ovary (after anthesis) conical, ca. 4 mm. long and 4.5 mm. diam. at base, 2-celled with 5–7 ovules in each cell, the style 5–6 mm. long, the stigma punctiform.

The outstanding feature of this species are (1) the small (2 mm. long) quickly caducous bracteoles; (2) the alternate position of the bracteoles on the pedicel, usually 2–4 and occasionally as much as 7 mm. below the calyx-lobes; (3) the narrow obovate serrulate leaves, retuse at the apex with impressed veins on the upper surface and (4) the eglandular calyx-lobes.

Standley (Contrib. U. S. Nat. Herb. **23**: 821. 1923) and Melchior (Nat. Pflanzenfam. ed. 2, **21**: 143, 1925) both intimate that this species and *T. Pringlei* (Rose) Standley are conspecific. If such were the case the name *T. chalicophila* would have priority by two years. However, the leaves in *T. Pringlei* are truly oblanceolate, never retuse at the apex, occasionally serrulate with the veins raised rather than impressed on the upper surface. The bracteoles, when present, are lanceolate, 3–5 mm. long, generally opposite and close to the calyx-lobes. However, in the type and in other occasional specimens, the bracteoles may be alternate with the lower bracteole about 2–3 mm. below the calyx. In both species the bracteoles are quickly caducous and the calyx-lobes are entire.

6. *Ternstroemia impressa* Lundell in Bull. Torrey Bot. Club, **66**: 599. 1939.

DISTRIBUTION: Mexico (Chiapas), Guatemala.

MEXICO: Chiapas: Chiquihuite, Mt. Tacana, alt. 2800 m., *E. Matuda* 2814 (TYPE, Mich; isotype, NY), March 27, 1939. — Pico de Loro, Barranca Honda, Siltepec, alt. 2600 m., *E. Matuda* 4077 (AA, Mich), Oct.–Nov. 1940 (shrub).

GUATEMALA: Dept. Huehuetenango, Soloma, alt. 3000 m., *A. F. Skutch* 993 (AA), August 17, 1934 (small tree, 20 ft. high, in second-growth woods).

Small tree or shrub. Branchlets with rough, grayish bark. Leaves coriaceous, obovate, 2.5–6.5 cm. long, 1.5–3.0 cm. wide, rounded or obtuse at apex, retuse, cuneate at base, granular-punctate on both surfaces, usually reddish below, the margin lightly serrulate, revolute, the midrib canaliculate above, the veins (5–7 pairs) deeply impressed above (as if etched), inconspicuous below, the petiole 4–6 mm. long. Pedicel 2.0–3.5 cm. long, the bracteoles either opposite immediately below calyx-lobes or alternate on pedicel, when opposite deciduous, when alternate persistent, broadly ovate, 2–3 mm. long, glandular-denticulate; calyx-lobes imbricate, subequal, outer lobes suborbicular or broadly ovate, 4–7 mm. long, 5–6 mm. wide, the margin scarious, entire or glandular-denticulate, the inner lobes broad-ovate, 6–8 mm. long, 5–6 mm. wide; petals obtuse or suborbicular at apex, 6–7 mm. long, 5–6 mm. wide, joined only for 1 mm. at base; stamens ca. 50, probably uni-seriate, appearing bi-seriate, 3.5–4.5 mm. long, the filaments 1 $\frac{1}{2}$ and 2 mm. long, uniformly linear, the anthers ca. 2 mm. long, the connective projected into a blunt apex ca. 0.5 mm. long; ovary umbonate at first, 1 mm. long, ca. 3 mm. diam. at base, 2-celled with ca. 5 ovules in each cell, the style 3 mm. long, the stigma punctiform. Fruit immature, conical.

This species is characterized by thick coriaceous leaves with deeply impressed veins on the upper surface. The two specimens collected by Matuda are characterized also by a reddish color on the lower surface of the leaf, especially on the midrib. However, in the Skutch specimen, the midrib is more nearly yellow. In the type, *Matuda* 2814, the outer calyx-lobes are distinctly glandular-denticulate, yet in *Matuda* 4077 and *Skutch* 993 the outer lobes are scarious and entire. In *Skutch* 993 and the type, *Matuda* 2814, both fruiting specimens, the bracteoles are opposite and immediately below the calyx, while in *Matuda* 4077, a flowering specimen, the bracteoles are alternate and situated on the pedicel. However, despite all this variation, there is no question concerning the status of the species and the relationship of the specimens cited above.

7. *Ternstroemia sylvatica* Schlechtendal & Chamisso in Linnaea, **5**: 220. 1831. — Hemsley, Biol. Centr.-Amer. Bot. **1**: 92. 1879. — Conzatti, Gen. Veg. Mexico, 111. 1903. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.
Mokofua silvatica (Schlechtendal & Chamisso) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.
Taonabo sylvatica (Schlechtendal & Chamisso) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893. — Rose in Contrib. U. S. Nat. Herb. **8**: 323, fig. 14. 1905. — Standley in Contrib. U. S. Nat. Herb. **23**: 822. 1923.
Ternstroemia occidentalis Sessé & Mocino, Fl. Mex. ed. 2, 128. 1894. Non Choisy 1855.
?Ternstroemia cuneifolia Sessé & Mocino, Fl. Mex. ed. 2, 128. 1894. Non Gardner 1845.

DISTRIBUTION: Mexico (Vera Cruz, Mexico, Guerrero, Hidalgo).

MEXICO: Vera Cruz: "In sylvaticis inter Jalapan et San Andres, Aug. atque prope San Miguel del Soldado," *Schiede & Deppe* 455 (ISOTYPE of *T. sylvatica*, G, Mo; photo & fragment, FM). — San Miguel del Soldado, alt. 1800 m., *C. G. Pringle* 8169 (AA, G, Mich, Mo, NY, US), April 20, 1899 (10–15 ft. high). — Zacuapan and vicinity, *C. A. Purpus* 2290 (FM, G, Mo, NY, US), Oct. 1906 (small tree). — Forests near Tecomatla and Tolutla, *C. A. Purpus* 10118 (G, NY, US), 10846 (FM, Mo, NY, US). — Sierra Chiconguiaco, *C. A. Purpus* 6226 (FM, G, Mo, NY, US), Aug. 1916. — Vallee de

Cordova, *M. Bourgeau* 2241 (G, US), April 2, 1866. Mexico: Temascaltepec and Toluca, in mountains, *Sessé & Mocino s.n.* (ISOTYPES of *T. occidentalis*, FM). Guerrero: Cliffs along Acapulco Bay, Acapulco, *O. M. Clark* 6903 (NY), June 23, 1935.—Hidalgo: Trinidad, *C. G. Pringle* 13480 (US), April 25, 1904.

Small tree with grayish rugose branchlets. Leaves chartaceous to subcoriaceous, oblong-elliptic to oblanceolate, 5.5–8.0 cm. long, 1.5–2.0 cm. wide, acuminate at apex, tapering at base, granular-punctate on both surfaces, the margin plane, entire, the midrib lightly canaliculate above, fading toward apex, the veins ca. 8 pairs, obscure, the petiole 3–5 mm. long. Pedicel short, usually less than 1 cm., occasionally up to 1.5 cm. long; bracteoles 2, opposite, immediately below calyx-lobes, deltoid-ovate, ca. 2 mm. long, 2.0–2.5 mm. wide at base, sparingly glandular-denticulate; calyx-lobes imbricate, subequal, rounded, the outer lobes ca. 5 mm. long and 4.5 mm. wide, very sparingly glandular-denticulate, often appearing entire, the inner lobes ca. 5 mm. long and 5 mm. wide; petals suborbicular, 6.0–6.5 mm. long and ca. 5 mm. wide, joined 1.5–2.0 mm. at base; stamens ca. 60, bi-seriate, 4–5 mm. long, the filaments linear, ca. 2.5 mm. long, joined at the base and adnate to the base of the corolla, the anthers linear, 1.5–2.0 mm. long, the connective projected into a short appendage 0.25 mm. long; ovary ovate at first, developing conically, 2 mm. long and ca. 2 mm. diam. at base, 2-celled, each cell with ca. 5 ovules, the style 5–6 mm. long, the stigma punctiform. Fruit conical to ovate, ca. 1.7 cm. long and 1.5 cm. diam.

The elliptic, acuminat, chartaceous leaves, seldom over 2 cm. wide, are the outstanding characters of this species. The pedicels are short, seldom over 1 cm. wide, usually less. Closely related, if not identical, is the dubious species *T. lineata* DeCandolle. This latter name is discussed later in this treatment under the heading "Dubious Species."

8. *Ternstroemia megaloptycha*, sp. nov.

Arbor parva, 6–12 metralis, ramulis teretibus griseis vel brunneo-griseis. Folia crasso-coriacea, obovata, 7–12 cm. longa et 3.0–4.5 cm. lata, apice obtusa vel rotundata, basi cuneata vel attenuata, margine integerrima, plana vel laeve subrevoluta, costa supra canaliculata, venis undique inconspicuis, petiolis 1.0–1.5 cm. longis. Pedicelli crassi, 2.0–2.5 cm. longi, bracteolis 2 inaequalibus, majore orbiculare 5–6 mm. longo et 4–5 mm. lato, margine glanduloso-denticulato, minore ovato vel deltoideo, 2.5–3.0 mm. longo et lato, margine glanduloso-denticulato; sepala 5, imbricata, granda, rotundata, sublignosa, exterioribus 10–11 mm. longis et ca. 11 mm. latis, margine glanduloso-denticulatis non scariosis, interioribus 11–12 mm. longis et latis, apice apiculatis, margine scariosis integerrimis; petala 5, pallide luteo-albida, 11–12 mm. longa et 7–10 mm. lata, basi ad 4 mm. connata; stamina ca. 70, bi-seriata, crassa, 7–9 mm. longa, filamentis 2–3 mm. longis, basi connatis et ad corollam adnatis, antheris 4.5–5.0 mm. longis, connectivo in apiculum 1+ mm. longum projecto; ovarium umbonatum vel subconicum, 2.5 mm. longum et basi 5 mm. diam., 2-loculatum, loculis 7–8-ovulatis, stylo 4.5–5.0 mm. longo, stigmatibus punctiformi. Fructus immaturus conicus, ca. 1.5 cm. longus et basi 1.2 cm. diam.

DISTRIBUTION: Honduras.

HONDURAS: Dept. Comayagua: San Luis, cut-over valley lands, alt. 750 m., *J. B. Edwards* 594 (AA, TYPE; FM, US), May 2, 1933 (tree 35 ft. high with ivory-

colored flowers).—San Luis, Rancho Grande, open mountain forest, alt. 1200 m., *J. B. Edwards* 220 (AA, FM), May 18, 1932 (tree 45 ft. high).—Malcotal, Minas de Ora, open mountain forest, alt. 1260 m., *J. B. Edwards* 201 (AA, FM), May 9, 1932 (tree 40 ft. high).—Near El Achote, above the plains of Siguatepeque, in forest at head of ravine, alt. 1350 m., *T. G. Yuncker, R. F. Dawson & H. R. Youse* 6372 (FM, G, Mich, Mo, NY, US), Aug. 7, 1936 (tree about 20 ft. tall, 6 in. diameter).—River bank, plains in vicinity of Siguatepeque, alt. 1050 m., *T. G. Yuncker, R. F. Dawson & H. R. Youse* 5592 (FM, G, Mich, Mo), July 2, 1936 (tree ca. 20 ft. tall, 6–8 in. diameter, leaves leathery, dark green and shining above, lighter beneath).—Vicinity of Siguatepeque, moist thickets and along stream in pine forest, alt. 1080–1400 m., *P. C. Standley* 55935 (AA, FM, US), 56187 (AA, FM, US), Feb. 14–27, 1928 (tree 20 ft.).—Dept. Santa Barbara: San Pedro Sula, alt. 1200 m., *C. Thieme* 5141 (FM, NY, US), May 1888.

This species is characterized by the largest flowering parts to be found in the Central American species. The bracteoles measure up to 5–6 mm. long and 4–5 mm. wide, as large as or larger than the calyx-lobes in most other species. The calyx-lobes and petals are over a centimeter long and generally nearly as wide. The stamens are thick and in some instances nearly as long as the petals, far exceeding those in other species in this region. Unfortunately the fruit is immature, but shows evidence of becoming rather large. The species seems to be confined to the Depts. of Comayagua and Santa Barbara in Honduras.

9. *Ternstroemia Tepezapote* Schlechtendal & Chamisso in *Linnaea*, **6**: 420. 1831.—Walpers, *Repert. Bot. Syst.* **1**: 369. 1842.—Choisy in *Mém. Soc. Phys. Hist. Nat. Genève*, **14**: 108 (*Mém. Ternstr.* 20). 1855.—Urbina, *Cat. Pl. Mex.* 19. 1877.—Conzatti, *Gen. Veg. Mex.* 111. 1903.—Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Mokofua tepezapote (Schlechtendal & Chamisso) O. Kuntze, *Rev. Gen. Pl.* **1**: 63. 1891.

Taonabo tepezapote (Schlechtendal & Chamisso) Szyszyłowicz in *Nat. Pflanzenfam.* III. **6**: 189. 1893.—Rose in *Contrib. U. S. Nat. Herb.* **8**: 323. 1905.—Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Ternstroemia Seleriana Loesener in *Bull. Herb. Bois. sér. 2*, **3**: 213. 1903.—Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Taonabo oocarpa Rose in *Contrib. U. S. Nat. Herb.* **8**: 322. 1905.—Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Taonabo sphaerocarpa Rose in *Contrib. U. S. Nat. Herb.* **8**: 322. 1905.—Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Ternstroemia Hemsleyi Hochreutiner in *Ann. Conserv. Jard. Bot. Genève*, **20**: 193. 1917.—Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Ternstroemia Hemsleyi Hochreutiner var. *dentobracteata* Hochreutiner in *Ann. Conserv. Jard. Bot. Genève*, **20**: 194. 1917.

Ternstroemia oocarpa (Rose) Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Ternstroemia sphaerocarpa (Rose) Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

DISTRIBUTION: Mexico, Guatemala, British Honduras, Honduras, Nicaragua, El Salvador.

MEXICO: Vera Cruz: Tecolutla, *Schiede s.n.* (TYPE, Berlin; photo, FM, G).—Misantla, *C. A. Purpus* 5958 (FM, G, Mo, NY, US), July 1912. Tabasco: Achotal, Balancan, *E. Matuda* 3104 (FM, Mich, NY), May 1939 (tree 7–9 m.). Chiapas: Mt. Ovando, *E. Matuda* S-193 (AA, Mich, Mo, NY), 641 (Mich, Mo, US), 656 (Mich, US), Apr. 1936, 1937.—Mountains near Tonalá, alt. 600–1000 m., *E. W. Nelson* 2904 (NY), 2994 (US, type of *T. oocarpa*), Aug. 1895.—Fenia, mountain slopes, *C. A. Purpus* 10015, 10153 (US), Apr. 1925.—Canjob, *E. A. Goldman* 785

(US), 789 (US), March 24, 1904. — Precise locality lacking, *Ghiesbreght 501* (FM, G, Mo). Oaxaca: Valley of Cuicatlan, alt. 2300–2400 m., *E. W. Nelson 1902* (US, type of *T. sphaerocarpa*; G, NY), Nov. 1894. — Cumbre de Talca, alt. 1800 m., *B. P. Reko 4045* (US), Feb. 20, 1919. — Sierra San Pedro Nolasco, Talea, etc., *C. Jurgensen 567* (type of *T. Hemsleyi*, photo and fragm. FM), 1843–1844. — Rincón Antonio, *C. R. Orcutt 3225* (FM, G, US), Apr. 21, 1910.

GUATEMALA: Dept. Santa Rosa: Santa Rosa, alt. 1000 m., *Heyde & Lux 2967* (G, US), 2969 (G, US), May 1892. — Zamorora, alt. 1675 m., *Heyde & Lux 2968* (G, Mo, NY, US), May 1892. Dept. Alta Verapaz: Secanquim, alt. 250–600 m., *O. F. Cook & C. B. Doyle 64* (US), Apr. 1904. — Secanquim, forest along Saklak River, alt. 200 m., *H. Pittier 227* (NY, US), May 1905. Dept. Huehuetenango: Chacula, in gorge, alt. 1600 m., *E. Seler 3099* (G, NY, US, isotypes of *T. Seleriana*), June 27, 1896 (shrub). Dept. Peten: La Libertad and vicinity, *M. Aguilar 30* (AA, FM, Mich, Mo, NY), Aug.–Nov. 1933. — La Libertad, *C. L. Lundell 2578* (FM, Mich, US), 3046 (AA, FM, Mich), 3541 (FM, Mich), 4883 (Mich), Apr.–July, 1933. — Monte Polol, *C. L. Lundell 3026* (FM), 3036 (Mich), Apr. 1933. — Lake Peten, *C. L. Lundell 3204* (FM, Mich), May 1933. — Near Chiché, *C. L. Lundell 1653* (Mich), May 1932 (large tree of savannah island flora). — Vaxactum to San Clemente, *H. H. Bartlett 12802* (AA, FM, Mich, NY), Apr. 1931. Dept. Izabal: Vicinity of Quirigua, on pine ridge, alt. 75–225 m., *P. C. Standley 24505* (AA, FM, G, Mo, NY, US), May 1922 (tree 25–40 ft. with dense irregular crown; flowers yellowish white). — Quebradas, open shrubby hillside, *S. F. Blake 7549* (G, US), May 1919 (tree 15 m.; flowers pinkish white with yellow-tipped anthers). — Between Mella and Izabal on Montana de Mico, alt. 65–600 m., *J. A. Steyermark 38530* (FM), Apr. 1940 (tree).

EL SALVADOR: *S. Calderon 1407* (G, Mo, NY, US), Dec. 1922 (large tree; vernacular name “*trompillo*”). — *S. Calderon 2319* (G, NY, US).

BRITISH HONDURAS: El Cayo, *H. H. Bartlett 13013* (AA, FM, Mich, NY, US), May 1931. — Middlesex, dense forest, alt. 60 m., *W. A. Schipp 344* (AA, FM, G, Mich, Mo, NY), Sept. 1929 (rare tree, 30 ft. high). — All Pines, secondary forest, *W. A. Schipp 556* (AA, FM, G, Mich, Mo, NY), July 1930 (tree 20 ft.). — Little Cocquericot, Belize River, Big Fall Pine Ridge, *C. L. Lundell 4320* (FM, Mich), Apr. 1933. — El Cayo Distr., Mt. Pine Ridge, San Agustín, in sandy pine-oak uplands, *C. L. Lundell 6838* (G, Mich, NY, US), July–Aug. 1936 (tree 17 m.). — El Cayo Distr., Vaca, on river bank, *P. H. Gentile 2480* (FM, Mich), Apr. 1938. — Between Mullins River and Manatee, in pinelands, *P. H. Gentile 3384* (AA, Mich, NY), Aug. 1940 (fruit yellow). — Toledo Distr., Monkey River, Swasey Branch, in hummock in pine ridge, *P. H. Gentile 3838* (AA), Dec. 1941. — Maskall, *P. H. Gentile 1270* (AA, FM, G, Mich, Mo, NY), July 1934.

Branchlets terete, gray, verticillate. Leaves coriaceous, oblong-obovate or obovate, 7–13 cm. long, 3–4 cm. wide, obtuse or rounded at apex, frequently bluntly acuminate, attenuate at base, the margin entire or slightly crenulate, subrevolute, the midrib canaliculate above, the veins inconspicuous on both surfaces, the petiole 0.7–1.0 cm. long. Pedicels 1.5–2.5 cm. long; bracteoles 2, unequal, opposite, broadly ovate and suborbicular, 2–3 mm. long, 3 mm. wide, glandular-denticulate along the margin; calyxlobes imbricate, unequal, the outer lobes suborbicular, ca. 8 mm. long and wide, the margin glandular-denticulate, the inner lobes broadly ovate or subelliptic, ca. 9 mm. long and 6 mm. wide, apiculate, the margin scarious, entire; petals lanceolate to ovate, ca. 8 mm. long and 4 mm. wide, acute at apex, joined nearly one-half their length; stamens ca. 50, bi-seriate, 4.5–5.5 mm. long, the filaments 1.0–1.5 mm. long, somewhat thickened, joined at base and adnate to base of corolla, the anthers 2.5–3.0 mm. long, the connective projected into an apicule ca. 1 mm. long; ovary flattened or um-

bonate, 1.5–2.0 mm. long, 3 mm. diam., 2-celled, each cell 4–5-ovulate, the style 6–7 mm. long, the stigma punctiform. Fruit conical or subconical, 1–2 cm. long, 1.0–1.5 cm. diam.

The type of this species was collected by Schiede at Tecolutla, Vera Cruz, and is deposited in the herbarium at Berlin. Photographs may be found at the Gray Herbarium and the Field Museum. The actual type is very fragmentary, consisting of a very few leaves and two fragmentary flowers past anthesis. Very little information concerning this species could be gleaned from an examination of this specimen, as Loesener attested in describing *T. Seleriana*.

Only one specimen, *C. A. Purpus 5958*, is found in American herbaria collected in Vera Cruz. To my mind, this is not typical *T. Tepezapote*, although, as in the type, the leaves are slightly crenulate along the margin. On the *Purpus* specimen, the outer calyx-lobes are only 4 mm. long and less than one-half the length of the inner lobes (8–9 mm.). The young immature fruit capsule is oblong-conical, ca. 1 cm. long and 0.5 cm. diameter. The type shows outer calyx-lobes smaller than the inner lobes but not to such a marked degree as is found in *Purpus 5958*.

The above specific description was drawn from *Matuda S-193*. To my mind this specimen is the most typical representative of *T. Tepezapote* examined. However, as far as that goes, any worker might select any specimen as typical and be justified in his selection. Several species, *T. Seleriana* Loesener, *T. oocarpa* Rose, *T. sphaerocarpa* Rose and *T. Hemsleyi* Hochreutiner have been placed under *T. Tepezapote* as synonyms. This action was taken only after several periods of study. Although there are minor variations, they are all too close for specific delimitation. I have considered them under the headings of varieties and forms and could not find any clear lines of separation based on any characters. They vary most in bracteole structure. As stated in an early paragraph, the bracteoles are always unequal in size and vary in shape as well, on a single flower. Both rounded and deltoid bracteoles may subtend the calyx-lobes on a single flower. Hence, we have variations from the minute deltoid (*Purpus 5958*, 1×1 mm.) through the ovate-triangular (*Ghiesbreght 501*, 2 mm. long) and the subrotund and ovate-deltoid (*Lundell 1653*, 3×3 mm.) to the broadly ovate and orbicular (*Nelson 1902*, 4.5×3.0 mm.). Combinations of these typical variations may be found on a single pedicel. The bracteoles of *T. oocarpa* are described as deciduous. In the type, this condition holds quite true. When present (a few were found) they are broadly ovate-elliptic, ca. 3.0 mm. long and 2.5 mm. wide. This character of deciduous bracteoles is not consistent. The fruit of *T. oocarpa* is markedly conical, but so are the fruits of all material cited above, to one degree or another.

To set up a series of varieties based on the bracteole character is not at all satisfactory, as I have discovered. From the Peten and Alta Vera Paz regions of Guatemala comes a series of specimens with large bracteoles, ca. 4 mm. long and 3 mm. wide, varying from subrotund to deltoid-ovate. This same type of bracteole is found on *Nelson 1902*, (Oaxaca), the type

of *T. sphaerocarpa*. On the type of *T. Hemsleyi*, the bracteoles are ca. 3 mm. long and wide but are ovate-triangular. In the latter specimen, the calyx-lobes are only sparsely glandular-denticulate, appearing entire.

From the El Cayo district of British Honduras a series of specimens has been collected with small minute deltoid bracteoles. However, in Vera Cruz and Oaxaca, specimens with similar small bracteoles are found. One might here suggest two varieties or at least forms. However, connecting the two is a series of variations making it impossible to draw a dividing line even on a geographical basis.

DUBIOUS SPECIES

Ternstroemia lineata DeCandolle in Mém. Soc. Phys. Hist. Nat. Genève. **1**: 409, t. 1 (Mém. Ternstr. 17, t. 1). 1822; Prodr. **1**: 523. 1824.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 105 (Mém. Ternstr. 17). 1855.—Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo lineata (DeCandolle) Rose in Contrib. U. S. Nat. Herb. **8**: 322. 1905.

DeCandolle, in the original description of this species, states: "Corolla subglobosa albida cum linea rubra transversali in medio loborum picta" and "Bracteolae nullae aut deciduae." The above quotations would indicate that the description was drawn from a plate of Moçño in the possession of DeCandolle or from a copy of the original. An actual type may be non-existent! I doubt the presence of a transverse red line on the corolla of any species of *Ternstroemia*! Possibly a mark or line across the petals caused by pressure against the stamens may be indicated. However, the illustration shows this marking on both surfaces of the corolla. Furthermore, DeCandolle, had he possessed an actual specimen, should have been able to distinguish definitely whether the bracteoles were "nullae aut deciduae." The bracteole scars, undoubtedly, were present, even though the actual bracteoles were not.

These two characters (corolla markings and bracteoles) are the only differences I can mark between *T. lineata* and *T. sylvatica*, and these two characters are as dubious as the species itself. However, I am unwilling to use the name *T. lineata* in place of the well established and well described *T. sylvatica*, one of the best known species in Mexico, unless the actual type can be found in the Madrid Herbarium.

EXCLUDED SPECIES

Ternstroemia Purpusii T. S. Brandege in Univ. Calif. Publ. Bot. **6**: 187. 1915 = ***Symplocarpon Purpusii*** (Brandegee) Kobuski in Jour. Arnold Arb. **22**: 191. 1941.

Ternstroemia serrulata Pavon ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 110 (Mém. Ternstr. 22). 1885 = ***Cleyera serrulata*** Choisy, loc. cit.

Ternstroemia siphilitica Pavon ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 110 (Mém. Ternstr. 22). 1855 = ***Cleyera integrifolia*** (Benth) Choisy, loc. cit.

STUDIES OF THE ICACINACEAE, III A REVISION OF EMMOTUM

RICHARD A. HOWARD

With four plates

THE genus *Emmotum* is the largest genus of the New World Icacinaceae. It now includes twelve species and is limited to northern South America, being centered in the Amazon basin. Few of the species are widespread and several are known only from a single mountain.

The genus is easily recognized and is quite distinct among the Icacinaceae. Van Tieghem was so impressed by its characters that he established it as the sole genus of a separate family, the Emmotaceae, allied to the Icacinaceae. The characters upon which he recommended this separation are pronounced; however, such family characters of the Icacinaceae as articulated flowers, valvate aestivation of the corolla, alternate stamens, and two pendent anatropous ovules, of which but one matures, are shared with his segregated unit and it seems preferable to retain it within the Icacinaceae.

Hamilton described *Emmotum* in 1825, crediting it to Desvaux. Miers was the first to recognize that *Pogopetalum*, which Bentham described in 1841, was identical with *Emmotum*. Engler, in 1872, proposed a division of the genus into two sections, which he called *Longistyla* and *Brevistyla*. These groups were based on differences in the petals, stamens, and pistils. Sleumer has accepted this same division, but he established subgenera and substituted the names *Euemmotum* and *Pogopetalum* for Engler's sections. The second section originally contained *E. nitens* (the type selected by Sleumer) and *E. glabrum*. Unfortunately, the latter species does not have the characters of the section and cannot belong there. This error may be traced to an inaccurate plate of Miers. These illustrations are confused and apparently there was an interchange of parts of the two species represented. Isotypes of the species and examination of the original descriptions show this clearly. By removing *E. glabrum* from the subgenus *Pogopetalum* (i.e. the section *Brevistyla* Engler), only *E. nitens* remains. Since the usefulness of this monotypic subgenus is doubtful, it seems advisable to abandon it. The genus *Emmotum* is, accordingly, undivided in this paper.

When van Tieghem proposed the Emmotaceae as a segregated family, he also separated *E. nitens* as a distinct genus, *Pogopetalum*. The characters justifying this newly proposed genus were those previously used by Engler as characters of his section *Brevistyla*. I am treating *Pogopetalum* van Tieghem as a synonym of *Emmotum*.

I am grateful to the directors and curators of the following herbaria for the use of the materials examined in this study: Arnold Arboretum (A), University of California (C), Field Museum of Natural History (FM),

Gray Herbarium (G), New York Botanical Garden (NY), United States National Herbarium (US).

EMMOTUM Desvaux ex Hamilton

Emmotum Desv. ex Hamilton, Prod. Fl. Ind. Occ. 29. 1825; Miers, Ann. Mag. Nat. Hist. II. **9**: 223. 1852, II. **10**: 176. 1852, III. **4**: 366. 1859, Contrib. Bot. **1**: 107. 1851-61; Benth. & Hook. Gen. Pl. **1**: 352. 1862; Baillon, Adansonia **3**: 93. 1863; Engler in Mart. Fl. Bras. **12**(2): 43. 1872; Valetton, Crit. Overz. Olac. 203. 1886; Engler, Nat. Pflanzenfam. **3**(5): 251. 1893; van Tieghem, Bull. Soc. Bot. France **44**: 119. 1897; Sleumer, Notizbl. **15**: 233. 1940.

Emmotum Sect. *Longistyla* Engler in Mart. Fl. Bras. **12**(2): 44. 1872.

Emmotum Sect. *Brevistyla* Engler, l.c.

Emmotum Subg. *Euemmotum* Sleumer, Notizbl. **15**: 233. 1940.

Emmotum Subg. *Pogopetalum* Sleumer, l.c.

Pogopetalum Benth. Trans. Linn. Soc. **18**: 680. 1841, Ann. Mag. Nat. Hist. **7**: 216. 1841.

Flowers perfect, 5-parted; calyx campanulate, fleshy, lobed, persistent; petals valvate, free, fleshy, hirsute, rarely glabrate outside, inside lanate on the raised midrib, the inflexed apex minute, glabrous; stamens free, alternate; anthers ovate-oblong, the thecae two, longitudinally dehiscent extrorsely along the junction with the connective, the connective fleshy, bilobed or cordate at the base, the filament attached basally to the connective or dorsally near the base, glabrous, fleshy, broad and flattened; pistil superior, the ovary globose or dorso-ventrally compressed, glabrous or densely hirsute, frequently with a differentiated fleshy sterile ring of tissue at the base, 2- or 3-loculed; ovules two to each locule, pendent from the apex, anatropous, almost collateral; style terminal or slightly eccentric, glabrous, the apex rounded or slightly 3-lobed; drupe with a thick putamen and one or rarely three fertile cells, one seed to each cell, curved, albuminous, the cotyledons orbicular, the radicle elongate.

Trees, rarely shrubs, the branches pubescent; leaves alternate, petiolate, exstipulate, simple, entire, coriaceous, pinnately and arcuately veined; inflorescence axillary, fascicled, paniculate, bracteate, the flowers articulated.

TYPE SPECIES: *Emmotum fagifolium* Desv. ex Hamilton.

DISTRIBUTION: Brazil, French and British Guiana, Peru, and Venezuela.

The species of *Emmotum* have been reported either as shrubs or as trees up to 45 feet in height and with trunk diameters of 8-12 inches. They grow in a variety of habitats, from sandy coastal plains to high mountains, but are predominately trees of undisturbed forests which are not flooded. Several species have been reported at 5000 feet altitude. The mature wood is available for study from only one species and the anatomy of the stem has been considered in another series of papers (Bailey and Howard, Jour. Arnold Arb. **22**: 129, 171-187, 432-442, 556-568. 1941).

The thick coriaceous leaves have the midrib and veins sulcate above and usually prominent below. The veins are either straight and parallel for most of their length, or are arcuate for their full length. The ends of the veins approach the margin of the leaf and remain free. Only in *E. conjunctum* do the tips anastomose noticeably. The texture of the leaf is thick and firm and the veinlets are obscure. Between the veins are minute trans-

verse ridges caused by the underlying fibers. Van Tieghem mentions these peculiar and quite numerous characteristic fibers, which surround the meristeles and the veinlets. Their walls are spirally thickened and the fibers add noticeably to the strength and consistency of the lamina.

The leaf-blade is usually densely pilose or tomentose on both surfaces when young and becomes glabrate and shining above. The pubescence on the lower leaf-surface may persist or may be lost very early. These thick-walled hairs are articulated to relatively large thin-walled bases. The bases are lighter in color than the rest of the epidermal cells and are quite noticeable in the older leaves. These are the structures to which, I believe, Miers applies the term glands. The pubescence in *Emmotum* frequently is a rich golden or brown color. In some instances the pubescence will lose its color and become silvery or gray as the leaf matures. In other species, however, there is no indication of this color change and the older leaves have a pubescence of the same color as the younger ones. A similar pubescence may be found on the young branches, the inflorescence, and the outside of the perianth. In many species the leaf-blade has, in addition to a colored pubescence, pigmentation in the cells. This pigmentation may also pervade the tissues of the bark and wood, the calyx and corolla, the filament and connective, and frequently the tissues of the ovary and the fruit. It appears to be similar to that also found in *Poraqueiba* and *Ottoschulzia*. It is removed by boiling in water and comes out very rapidly in hot caustic soda. Not all of the cells of the tissues contain this pigment, but some cells are very full of it.

The axillary inflorescences found in *Emmotum* are composed of 3-8 panicles. They are usually shorter than the petioles and are few-flowered. Axillary inflorescences are also found in many other New World genera, but in none are they so compact, clustered, pubescent, and bracteate. The pedicels are short and bear several ovate bracts. Usually one of these is at the apex of the pedicel and subtends the articulation of the flower. As many authors have noted, the open flowers bear a striking resemblance to *Ximenia* of the Olacaceae.

The calyx is fleshy, with the lobes usually well developed. It enlarges only slightly, if at all, in fruit. The corolla is typical of the family, having hypogynous free petals with a minute inflexed apex. The midrib of the petal is fleshy and well developed into a ridge, which bears a dense red-brown wool usually covering at least the upper two-thirds of the midrib. The one exception to this is found in *E. nitens*, which has the fleshy midrib but has only two clusters of hairs, one near the base and the other at the apex. In all cases the remainder of the inner face of the petal is glabrous, as the pubescence is limited to the midrib. Miers reports that the pubescence bears small glands. I have found none. The hairs when dry are rugose or warty and may even appear as a string of beads, and frequently these irregularities disappear upon swelling in caustic soda. Various collectors report the petals as white, cream, or tawny in color. They are reflexed at maturity and fall very early.

The stamens are extrorse, a condition rarely found in the family. Bentham

reported an introrse dehiscence for *Pogopetalum*; however, he illustrates an extrorse dehiscence in his accompanying plate. The thecae of the anthers are reduced to two. Van Tieghem compares them with the interior pair of a normal tetrathecal anther. The dehiscence is longitudinal, however, and takes place along the junction with the connective. Similar dehiscence is found in *Poraqueiba* and *Oecopetalum*. The attachment of the anther with the filament is either basal or dorsal. In some specimens the filament may arch abaxially to the anther; however, this is not conspicuous. The filament is fleshy and flattened. It is frequently reported as fused with the petals, but, at best, this fusion is only weak. The filament curves outward at anthesis.

Usually the ovary in this genus has three locules; however, this number may be reduced to a single one. *Emmotum glabrum* consistently has only two locules. In the family the plural locular condition is not limited to *Emmotum*. It is relatively common in *Citronella* and it has been reported in *Pennantia*. The three locules are eccentrically placed, thereby giving the impression that they represent the remainder of a former 5-loculed ovary. Each locule has two anatropous ovules which are pendent from the apex of the cavity. They are not exactly superposed nor are they collateral, usually having some intermediate position. Only one ovule matures. The style is either terminal or eccentric. When it is terminal the vascular traces are in the axis of the three locules, that is, eccentric. However, the more common condition is a strongly eccentric style. Previous workers have referred to a disk in the flowers of this genus. This term they applied to the ovary-wall, which is fleshy, glabrous or pubescent, and slightly swollen. A section cut through this region shows that the tissue of this sterile area is lighter in color in that it lacks the pigmented cells present elsewhere. In no sense does this tissue seem to be an expansion of the torus or the receptacle. It is not free from the ovary, and both this area and the upper portion of the ovary are covered with a thick epidermis which bears the indument. It seems to be a misapplication of the term to call this area a disk, and it might better be considered simply a differentiated basal sterile ring of ovarian tissue.

The mature drupe may have one to several cells. I have not seen any specimens which have developed seeds. Other workers, however, have reported from one to three locules in the mature fruit with one seed in each. The seed is reported as curved, albuminous as in the rest of the family, with a curved embryo, an elongated radicle, and orbicular cotyledons. The putamen of these fruits is relatively thicker than that of any other New World genus. The outer surface is sharply but irregularly ornamented or dissected, while the inner surface of the locule is smooth.

The relationships of this genus appear to be with *Poraqueiba*, *Oecopetalum*, and possibly with *Ottoschulzia*.

KEY TO THE SPECIES

Style shorter than the ovary or scarcely equalling it; anther-sacs folded inward, the anther basally attached to the filament.

- Petals with two distinct clusters of hairs on the midrib; anther as long as or longer than the filament, the connective extended beyond the incurved thecae; style noticeably eccentric; leaves pubescent below at maturity, the lateral veins evident.
- Leaves ovate-orbicular.....1. *E. nitens*.
 Leaves lanceolate.....1a. *E. nitens* var. *angustifolium*.
- Petals with a continuous lanate pubescence on the midrib; anther shorter than the filament, the connective not exceeding the incurved thecae; style essentially terminal; leaves glabrous at maturity, the lateral veins obsolete...2. *E. argenteum*.
- Style at least twice the length of the ovary; anther-sacs usually flat.
- Ovary glabrous.
- Leaves orbicular, the apex rounded, with a short cusp.....3. *E. nudum*.
 Leaves ovate, the apex acuminate.
- Mature leaves glabrous below, the lateral veins 6 or 7 pairs; petioles short, 1-1.4 cm. long; petals 3.5-4.0 mm. long; stamens 3-3.5 mm. long, the anthers ovate.....4. *E. acuminatum*.
- Mature leaves densely tawny pubescent below, the lateral veins 10 or 11 pairs; petioles 1.5-2.0 cm. long; petals 6-6.5 mm. long; stamens 5.5 mm. long, the anthers ovate-oblong.....5. *E. floribundum*.
- Ovary hirsute.
- Exterior of perianth almost glabrous; ovary two-celled; sepals pubescent only at the tips; petals sparsely pubescent outside on a median line; anther-sacs folded inward, the anther attached basally to the filament; leaves glabrous at maturity.....6. *E. glabrum*.
- Exterior of perianth densely pubescent; ovary three-celled; sepals and petals evenly pubescent outside; anther-sacs flat, the anther attached dorsally above the base; leaves pubescent or becoming glabrate.
- Leaves ovate to orbicular.
- Leaves orbicular, the apex obtuse, the lateral veins 6 pairs...7. *E. orbiculatum*.
 Leaves ovate, the apex acute or acuminate.
- Leaves densely fulvo-sericeous below, the veins 11 pairs, the lamina 10-22 cm. long, 8-13 cm. broad.....8. *E. holosericeum*.
- Leaves short and conspicuously hirsute below, smaller, the lateral veins 6-8 pairs, the lamina 8-12 cm. long, 4-7 cm. broad.....9. *E. affine*.
- Leaves oblong or elliptic.
- Veins obsolete.....2. *E. argenteum*.
 Veins prominent.
- Lateral veins 12 or 13 pairs, pinnate, parallel, conspicuously anastomosing at the margins, the lamina bicolorous.....10. *E. conjunctum*.
- Lateral veins 7-9 pairs, arcuate, free at the margin, the lamina concolorous.
- Pistil with a differentiated sterile glabrous area conspicuously developed at the base; plant silky-white-short-pilose or sericeous; petioles slender.....11. *E. fagifolium*.
- Pistil without the differentiated area conspicuously developed at the base; ovary pubescent almost to the base; plant densely golden-brown-hirsute; petioles stout.....12. *E. fulvum*.
1. **Emmotum nitens** (Benth.) Miers, Ann. Mag. Nat. Hist. II. **10**: 180. 1852.
Pogopetalum nitens Benth. in Hook. Lond. Jour. Bot. **2**: 377. 1843.
Siagonanthus sericeus Pohl ex Engler in Mart. Fl. Bras. **12**(2): 46, as synonym. 1872.
- Tree, the branches striate, angular, densely short-gray-pubescent; petioles 1-2 cm. long, deeply but narrowly sulcate above, densely gray-pubescent; lamina oblong, 7-14 cm. long, 4-8 cm. broad, coriaceous, glabrous, shining above, densely gray- or brown-short-pilose or sericeous below, the apex acuminate or acute, the base rounded, the margin slightly revolute, the midrib sulcate above, prominent below, the lateral veins 6 or 7 pairs,

inconspicuous above, arcuate, free at the ends; panicles 3 or 4, fascicled, 1–1.3 cm. long, densely yellow- or brown-short-pubescent; bracts ovate, acuminate at the apex, densely pubescent; calyx 2 mm. in diameter, fleshy, densely pubescent, the lobes 0.5 mm. high, obtuse, rarely acute; petals lanceolate or broadly lanceolate, 3–4 mm. long, 1–1.3 mm. broad, acute at the apex, densely strigose or hirsute, white- or golden-brown-pubescent outside, inside bearing two large clusters of lanate hairs, one at the base and the other near the apex of the fleshy raised midrib, the rest of the petal glabrous, the inflexed apex short, glabrous or rarely minutely papillate; stamens 2.8–3.2 mm. long, the anthers attached basally, 1.5–1.8 mm. long, the thecae incurved, the connective oblong, fleshy, curved, extending beyond the thecae to an obtuse or rounded apex, the filament shorter than the anthers at anthesis; pistil shorter than the stamens, 1–1.5 mm. high at anthesis; ovary globose, densely short-gray- or golden-brown-pilose, the base differentiated into a fleshy glabrous sterile area, the ovary three-celled; style eccentric, much shorter than the ovary, glabrous, minutely three-lobed at the apex; drupe depressed-globose, 1–1.5 cm. in diameter, 1–1.2 cm. high, sparingly pilose, becoming glabrate, the putamen extremely thick, rugose or sculptured outside, the three locules each one-seeded.

TYPE COLLECTION: *Gardner 3309*, from Pernambuco, Brazil.

ILLUSTRATIONS: Miers, *Contrib. Bot.* **1**: t. 22. 1851–61; Mart. *Fl. Bras.* **12**(2): t. 9. 1872; *Nat. Pflanzenfam.* **3**(5): fig. 139, *M-O*. 1893.

DISTRIBUTION: Brazil (Pernambuco, Matto Grosso, Minas Geraes, Goyaz, Bahia).

BRAZIL. Matto Grosso: Santa Clara de Chapada, *Malme 1470* (G). Minas Geraes: Paracatu, *Glaziou s.n.* (NY); Corinto, Corrigo diamante, alt. 590 m., *Mexia 5591* (FM, G, NY, US). Goyaz: *Gardner 3309* (FM, G, NY, ISOTYPES); *Burchell 9233* (G). Bahia: Serra de Açurua, Rio S. Francisco, *Blanchet 2889* (FM, NY). Without locality: *Herb. Hook. 1105* (G); *Pohl s.n.* (FM), 1935 (G), 1936 (G).

Both Glaziou and Mexia report this plant to be a large tree. The plant in dried condition may have either a golden-brown or a gray to silky-white pubescence on all parts, particularly on the under side of the leaves. The upper leaf-surface is commonly shining and usually is a dark purple when dry. Frequently two bracts are found immediately below the calyx, surmounting the pedicels. The separated clusters of hairs on the inside of the petals are very different from anything else found in the genus. The noticeable incurving of the anther-sacs and the obtuse incurved projecting tip of the connective characterize the anthers of this species. The basal attachment of the anther to the filament is found only in this species and *E. glabrum*. A belt of dark stained cells is commonly present in the middle of the filament. The stamens do not recurve in *E. nitens* at anthesis, as they do in the rest of the species, but remain arched over the pistil. The short style is the initial character of Engler's section *Brevistyla* and has a counterpart only in *E. argenteum*. This species was indicated as the type of van Tieghem's genus *Pogopetalum*.

Miers seems to have made an error in the plates of *E. nitens* in *Contrib. Bot.* **1**: pl. 22. The petals as drawn on *E. nitens* probably belong with *E. glabrum*. I have examined isotypes of numbers cited by Miers and find that the specimens do not agree with his plates. Engler in *Nat. Pflanzen-*

fam. has redrawn the petals of *E. nitens* and has correctly shown the separation of the clusters of hairs on the inside of the petals.

Bentham's original description indicates the ovary as glabrous. Examination of cited material shows that this also must have been an error.

- 1a. **Emmotum nitens** (Benth.) Miers, var. **angustifolium** Engler in Mart. Fl. Bras. **12**(2): 46. 1872.

Schnizleinia nitida Mart. ex Engler, l.c., as synonym.

Leaves narrow, lanceolate; panicles few-flowered, equal in length to the petiole.

ILLUSTRATION: Mart. Fl. Bras. **12**(2): t. 9, fig. 2. 1872.

I have seen no specimens referable to this variety, but Engler's plate shows well the varietal differences described.

2. **Emmotum argenteum** Gleason, Bull. Torrey Bot. Club **58**: 385. 1931.

Small slender shrub, the branches terete, densely sericeous when young, becoming glabrate; petioles short, 5–7 mm. long, densely sericeous, broadly sulcate above; lamina oblong, 7–10 cm. long, 3.5–4.5 cm. broad, coriaceous, red-brown in color, the apex abruptly acuminate to a sharp cusp 10–14 mm. long, the base rounded, the margin flat, the young leaves densely silvery-sericeous on both sides, becoming glabrate except on the midrib above and below, the midrib prominent below, the veins weakly developed or obsolete, the veinlets scarcely visible; inflorescence few-flowered, densely sericeous; bracts ovate; calyx 2 mm. in diameter, 2 mm. high, the lobes ovate, acute, 0.9–1.2 mm. long, 0.8 mm. broad, sericeous outside, inside weakly villose or lanate; stamens 2.0–2.8 mm. long, the anthers ovate, 0.8–0.9 mm. long, separate at the base, the thecae recurved, the connective fleshy, not exceeding the anther-sacs, the filaments attached at the base of the connective, fleshy, broadest near the apex; ovary globose, 1–1.4 mm. in diameter, 2- or rarely 3-celled, densely long-white-hirsute to the base, with no sterile area conspicuously differentiated; style straight, 0.6–0.8 mm. long, terminal, glabrous, 3-toothed at the apex; fruit unknown.

TYPE COLLECTION: Tate 564 (NY), collected in Amazonas, Venezuela, on Mt. Duida.

Emmotum argenteum was collected at an altitude of 4800 feet. It is a distinct species and may be readily recognized through its dense pubescence on the younger parts, the practically obsolete and inconspicuous lateral veins of the subglabrous mature leaves, the fleshy filaments, and the two-celled ovary. The two-celled ovary has a terminal style, and these two conditions are found elsewhere in the genus only in *E. glabrum*, which also has the inconspicuously veined leaves but has a different leaf-shape. The relationship of this species is, more correctly, with *E. glabrum*. I have not seen any evidence of the 3-celled ovary reported in the original description.

3. **Emmotum nudum** sp. nov.

Emmotum orbiculatum sensu Engler in Mart. Fl. Bras. **12**(2): 45. 1872; not Miers.

Arbor amazonica; ramulis cinereis; petiolis 9–18 mm. longis crassis profunde sulcatis breviter cinereo-pubescentibus; laminis orbiculatis, 9.5–13 cm. longis, 7–9 cm. latis, supra glabris nitidis nervo medio sulcato notatis, subtus dense sericeo-pilosis nervum medium prominentem et nervos laterales subprominentes 7-arcuatos ad apicem liberos gerentibus, apice rotundatis aut obtusis mucronatis, basi rotundatis; calyce campanulato, 2 mm. dia-

metro, 1.5 mm. alto, sericeo-piloso, lobis triangularibus, 0.5 mm. longis, 0.7 mm. latis, obtusis; petalis ovatis vel lanceolatis, 4.7 mm. longis, 1–1.2 mm. latis, latere interiore carinam rufo-lanatum proferentibus, latere exteriori sericeis; staminibus 3–4 mm. longis, antheris ovato-oblongis 1–1.1 mm. longis, thecis planis; ovario globoso 1 mm. diametro glabro 3-loculato; stylo eccentrico 2 mm. longo glabro; fructu drupaceo globoso, 1.2 cm. longo, 1.0 cm. lato, 0.4 cm. alto.

ILLUSTRATION: Plate 1.

BRAZIL. Pará: Faro, "in campis arenosis loco Tigre," Dec. 31, 1929, *Ducke 11367* (US 1473378, TYPE); campos a l'est de Faro, *Ducke 8707* (US). Amazonas: Rio Negro, above the opening of the Casiquari, *Spruce 3541* (FM, photo, G, NY).

This plant is distinct in its orbicular leaves and glabrous pistil. The flowers are white and odorous, according to Ducke. The fruit is 3-celled, with apparently only one seed developing in each cell; however, all the seeds are aborted in the fruits I have available for study. The mature fruits are prominently three-lobed. A section through the sclerified putamen shows several cavities present other than the three ovuliferous locules. The locules are oblong in section, eccentric, smooth inside and regular in outline. There are two smaller cavities between these locules and two larger cavities, circular in section, outside of the lateral locules. These four cavities are irregular in shape and very rough on the inner surface. They are empty in all the specimens I have seen. While two of them are larger in section than are the ovuliferous locules, none of them have the vertical extension of the locules. These cavities do not appear to be developed at the flowering stage.

Pogopetalum orbiculatum was described by Benthham and was based on a Schomburgk collection from the Padawire river, Amazonas, Brazil. Benthham definitely notes the hirsute or pilose nature of the pistil. Nevertheless Engler has referred a Spruce collection (3541) with strictly glabrous pistils to this species. I regard the Spruce specimen as specifically distinct and have placed it with *Emmotum nudum*. While the collections cited by Engler appear similar in leaf-form, the strictly glabrous nature of the pistil in *Emmotum nudum* suggests that a different species is represented.

It might be noted here that the specimens collected by Ducke called "*E. orbiculatum*" and later referred to *E. acuminatum* (Arch. Inst. Biol. Veg. Rio 4: 45. 1938) are representatives of the present species.

4. *Emmotum acuminatum* (Benth.) Miers, Ann. Mag. Nat. Hist. II. 10: 178. 1852, Contrib. Bot. 1: 108. 1851–61.

Pogopetalum acuminatum Benth. Trans. Linn. Soc. 18: 685. 1841, Lond. Jour. Bot. 2: 377. 1843.

Medium-sized tree, the branches terete, slightly striate, sparsely puberulent, soon becoming glabrate; petioles 1.3–2.0 cm. long, sulcate above, puberulent when young, becoming glabrate; lamina ovate-oblong to oblong, 8–15 cm. long, 5–8 cm. broad, glabrous, shining above, usually darkening on drying, appressed-hirsute or pilose when young, becoming glabrate except on the veins and midrib, the midrib sulcate above, prominent below, the lateral veins 6 or 7 pairs, arcuate, free at the ends, the veinlets inconspicuous, the apex narrowly long-acuminate to a mucronate point 1–2 cm. long, the base rounded, the margin slightly revolute; inflorescence about equal to

the petiole in length, densely short-sericeous; calyx campanulate, 1.5 mm. in diameter, 1 mm. high, the lobes broadly triangular, 0.2–0.3 mm. high, nearly obtuse, densely short- and finely sericeous; petals oblong-lanceolate, 3.5–4.6 mm. long, 1.1–1.3 mm. broad, lightly sericeous outside, red-lanate inside; stamens 3.1–4 mm. long, the anthers oblong-ovate, 1–1.2 mm. long, the thecae flat, equidistant at both ends, the connective oblong, rounded at the base and apex, attached to the filament dorsally near the base, the filament broadest at the base; pistil glabrous, 3.5 mm. high at anthesis, the ovary globose, 1 mm. in diameter at anthesis, with a conspicuous differentiated area at the base, 3-loculed, the style eccentric, 2.3 mm. long, the apex rounded; drupe 1.5 cm. diameter, depressed-globose.

TYPE COLLECTION: *Schomburgk 970*, collected on the Kukenam River, Amazonas, Brazil.

ILLUSTRATION: Miers, Contrib. Bot. 1: t. 21, 1851–61.

BRAZIL. Amazonas: Kukenam River, *Schomburgk 970* (FM, G, US, ISOTYPES); Manáos, near Cochaieira, *Ducke 376* (A, FM, NY, US); Rio Negro, between Barcellos and Sta. Izabel, *Spruce 1989* (photos FM, G).

The Schomburgk specimens bear labels citing the country of origin as British Guiana. In his Fauna and Flora of British-Guiana, page 1095, Richard Schomburgk reports *Pogopetalum acuminatum* from the banks of the Kukenam, and according to Roth's translation of Schomburgk's Travels in British Guiana 1840–44 (Vol. 2, map facing page 176), this river is one of the headwaters of the Caroni. Careful checking shows that this collection was made in Brazil near the boundaries of Venezuela and British Guiana. Benthams, in his original description of the species, cites the Schomburgk collection as from the banks of the Rio Negro.

Emmotum acuminatum can easily be recognized by its glabrous pistil and ovate long-acuminate leaves. I have not seen the fruits of this species, and my description of the drupe is taken from earlier descriptions. *Emmotum acuminatum* is a tree to 30 feet tall, with pure white flowers.

5. *Emmotum floribundum* sp. nov.

Arbor parva; ramis subteretibus cinereo-pubescentibus mox glabrescentibus; petiolis tenuibus 1.5–2 cm. longis anguste sulcatis cinereo-pubescentibus; laminis ovatis vel oblongis, 9–12 cm. longis, 4.5–5 cm. latis, supra nitidis glabris castaneis, subtus breviter et adpresse castaneo-hirsutis, nervos laterales 10 subprominentes arcuatos ad apicem liberos gerentibus, apice acutis, basi rotundatis; paniculis 3 vel 4 fasciculatis breviter fusco-sericeis; calyce campanulato, 2 mm. diametro, 1.3 mm. alto, sericeo, lobis triangularibus, 0.6 mm. longis, 0.7–0.8 mm. latis; petalis lanceolato-ovatis vel lanceolatis, 6–6.3 mm. longis, 1.5 mm. latis, extus dense cano-sericeis, intus secus costam castaneo- aut rufo-lanatis; staminibus 5.5–6 mm. longis incurvis, antheris ovato-oblongis 1.2 mm. longis, thecis planis, filamentis planis 0.7 mm. latis basim versus dilatatis; ovario globoso glabro 1 mm. diametro 3-loculato; stylo eccentrico 4 mm. longo glabro; fructu ignoto.

ILLUSTRATION: Plate 2.

PERU. Loreto: Mishuyacu, near Iquitos, alt. 100 m., forest, April 1930, *Klug 1212* (FM, TYPE).

VERNACULAR NAME: *Ingaina*.

Klug reports this to be a tree 40 feet tall, with cream-colored flowers. It is distinct from the other species of *Emmotum* in having a broader inflorescence with large flowers, a glabrous pistil, and ovate leaves with more numerous veins. Only *E. glabrum* has been reported previously from Peru. The present species is closest to *E. acuminatum*.

6. *Emmotum glabrum* Benth. ex Miers, Ann. Mag. Nat. Hist. III. 4: 366. 1859, Contrib. Bot. 1: 230. 1851-61.

Tree, the branches slender, terete, short-cinereous-pubescent; petioles short, 7-9 mm. long, slender, dorsally canaliculate above with the margins flaring, almost winged, sparsely short-crispate or hirsute-pubescent; lamina ovate to elliptic, 6-9 cm. long, 3.5-4.5 cm. broad, the upper surface glabrous, dull, rarely shining, the lower surface lighter, short-hirsute when young, soon becoming glabrate, ferrugineous when dry, the apex long and narrowly attenuate to a mucronate point 1-1.5 cm. long, the base rounded, the margin flat or slightly revolute, the midrib sulcate above, prominently developed below, the veins almost inconspicuous on both sides, weakly and irregularly arcuate, free at the ends; inflorescence few-flowered, the panicles slender, slightly exceeding the petioles or to 1.5 cm. long, sericeous; calyx campanulate, 2 mm. in diameter, 1 mm. high, the lobes ovate, 0.6-0.7 mm. high, rounded or acute at apex, glabrous but for a ciliated apex or cluster of pilose hairs on the tip; petals ovate-lanceolate, 3.0-3.6 mm. long, 0.7-1.0 mm. broad, glabrous outside but for a median row of short pilose hairs, inside densely red-brown-lanate on the midrib; stamens 3-3.6 mm. long, incurved, the anthers ovate-oblong, 1-1.2 mm. long, the thecae incurved, slightly separate at the base, the filaments broadest at the base; pistil 2.6-3.0 mm. high, the ovary globose, densely silky-hirsute, 1 mm. diameter at anthesis, with a differentiated sterile and pubescent base, 2-loculed; style eccentric, glabrous, 1.4-2.0 mm. long, the apex 3-toothed or rounded; fruit unknown.

TYPE COLLECTION: *Spruce 3536*, collected on the Rio Negro, Amazonas, Brazil.

ILLUSTRATION: Miers, Contrib. Bot. 1: t. 22. 1851-61, as to habit only.

BRAZIL. Amazonas: Rio Negro, *Spruce 3536* (FM, G, NY, ISOTYPES). PERU. San Martín: Chazuta, on Río Huallaga, alt. 200 m., *Klug 3990* (FM, G, NY).

The collection by Klug from Peru is only slightly different from that of Spruce. Klug's collection bears an unpublished herbarium name derived from the country of origin. This Peruvian material differs from the Spruce collection in having the inflorescence shorter than the petioles, the sterile base of the ovary essentially glabrous or with only a few hairs, and the locules abutting on the narrow ends instead of lying parallel for their length. While these differences seem consistent, I do not consider them of sufficient importance to merit specific distinction, even though the two collections were obtained some distance from one another.

I have examined duplicates of the collection cited by Miers and Engler and do not agree with certain details of their descriptions of this species. Neither author indicates the presence of some pubescence on the outside of the corolla. The corolla is sparsely pubescent rather than glabrous. The figure given by Miers is inaccurate, apparently representing some parts of materials derived from *E. nitens*, as was mentioned earlier. Miers illus-

trates separate clusters of hairs on the petals, which are characteristic of *E. nitens* and not of *E. glabrum*. He figures an extension of the connective beyond the anther-sacs, and Engler describes the same. I have seen no indication of this development in the isotypes of *E. glabrum*. Curiously Miers also illustrates a pubescent calyx, but in this case he makes no mention of this character in his description. His habit sketch of the plant, however, is a good representation of the present species.

Klug reports the plant to be a tree 25 feet tall, with cream flowers.

7. ***Emmotum orbiculatum*** (Benth.) Miers, Ann. Mag. Nat. Hist. II, **10**: 178. 1852, Contrib. Bot. **1**: 108. 1851-61.

Pogopetalum orbiculatum Benth. Trans. Linn. Soc. **18**: 685. 1841, Lond. Jour. Bot. **2**: 377. 1843.

Tree, the branches spreading, cinerous- to fulvo-tomentose; petioles stout, 1.2-1.5 cm. long, deeply sulcate; lamina ovate-orbicular, 7-8.5 cm. long, 6.5 cm. broad, glabrous and shining above except in the sulcate midrib, fulvo-tomentose below, the apex obtuse or slightly mucronate, the base rounded, the margin slightly revolute, the midrib sulcate, the lateral veins 6 pairs, parallel, arcuate toward the margin, free at the ends; inflorescence to 2 cm. long; calyx puberulent, the lobes ovate; petals ovate, 4 mm. long, pubescent outside, barbate or lanate inside; stamens shorter than the petals, the anthers oblong-ovate, the thecae approximate at the apex, slightly separated at the base; ovary globose, hispid, 3-loculed; style eccentric, glabrous; drupe depressed-globose, 1-celled.

ILLUSTRATION: Benth. Trans. Linn. Soc. **18**: t. 42. 1841.

This species is based on a Schomburgk specimen from the Padawire (Padaury) River, a northern tributary of the Rio Negro in Amazonas, Brazil. In his Fauna and Flora of British Guiana, Richard Schomburgk reports the collections as from the "vicinity of Roraima." I have seen no authentic material nor specimens referable to this species. In Bentham's original plate the ovary is clearly figured as pubescent and described in the text as hispid. Engler (in Mart. Fl. Bras. **12**(2): 45. 1872) referred a Spruce collection here and emended the description of Bentham to describe a glabrous ovary. Since throughout the genus the presence or absence of pubescence seems to be a good specific character, it is probable that Engler improperly included more than one species in his concept of *E. orbiculatum*. The glabrous form which was included by Engler in Bentham's species I have segregated as *E. nudum*. The true *E. orbiculatum* may be recognized by the hispid ovary. The orbicular leaves are almost unique in the genus.

When Miers treated *E. orbiculatum*, he cited a specimen collected on the Rio Preto in Pernambuco by Gardner (2941) as referable to this species. However he also cited the same number under *E. nitens*. The same collection was previously cited by Bentham in the original description of *E. nitens*. Engler refers *E. orbiculatum* to both Pernambuco and Brazilian Guiana on the basis of the Gardner specimen. While I have not seen this material, it is evident that Miers made an error and that the Gardner material belongs in *E. nitens*. *E. orbiculatum* is apparently known only from the original collection.

8. **Emmotum holosericeum** Ducke, Arch. Inst. Biol. Veg. Rio 4: 45. 1938.

Tree, the branches terete, longitudinally striate, densely red-brown-tomentose when young, becoming glabrate; petioles stout, 2–3 cm. long, strongly sulcate above, longitudinally ridged, densely brown-tomentose; lamina ovate to broadly elliptic-ovate, 10–22 cm. long, 8–13 cm. broad, densely golden-brown-tomentose above when young, becoming glabrate and shining except in the sulca of the midrib, below densely golden- or brownish-sericeous-pilose, not becoming glabrate, the midrib deeply sulcate above, prominent below, densely pubescent, the lateral veins 10–12 pairs, sulcate above, conspicuous below, parallel, arcuate only near the margins, free at the ends, the apex acute, rarely acuminate or obtuse, the base rounded, the margin revolute; panicle 2–4.5 cm. long in fruit, stout, densely pubescent; flowers not known; drupe depressed-globose, sparsely short-pilose, 2.0 cm. in diameter, the mesocarp thin, fleshy, the putamen woody, 2.3 mm. thick, the locules three, evenly developed and regularly spaced, the seeds one in each locule.

TYPE COLLECTION: *Ducke 35548*, from Borba, Rio Madeira, Amazonas, Brazil.

BRAZIL: Amazonas: Borba, Rio Madeira, April 7, 1936, *Ducke 35548* (US, ISOTYPE), *Ducke 289* (NY).

Careful examination of the mature fruit of this species shows the presence of a few scattered hairs. It is assumed, therefore, that the pistil was likewise pubescent and that the affinities of this species must be with *E. orbiculatum* and *E. jagifolium* rather than with *E. acuminatum*.

These plants are readily identified by the beautiful dense golden-sericeous pubescence on the lower side of the leaf. This is found in an unreduced state in the oldest leaves on the sheets that I have seen. This is the only species of the genus for which I have seen mature wood specimens. Wood specimens are available at the Yale School of Forestry and microscope slides of the same in the Harvard wood collection.

It may be necessary to reconsider this species when more is known about *E. orbiculatum*. At present, *E. holosericeum* may be distinguished by its larger leaves, more numerous veins, and the striking golden-brown pubescence.

9. **Emmotum affine** Miers, Ann. Mag. Nat. Hist. II. 10: 180. 1852, Contrib. Bot. 1: 110. 1851–61.

Pogopetalum affine Planch. ex Miers, l.c.

Tree, the branches terete, the younger branches short-brown-strigose or hirsute-pubescent, becoming glabrate; petioles slender, 1–2 cm. long, narrowly sulcate above, short-brown-pubescent, becoming glabrate; lamina ovate, 8–12 cm. long, 4–7 cm. broad, hirsute above, becoming glabrate except near the base and in the sulca of the midrib, shining at maturity, densely short-brown-appressed-hirsute below, becoming glabrate, the midrib sulcate above and prominent below, the lateral veins 6–8 pairs, slightly sulcate, arcuate, free at the ends, the apex acute or attenuate, occasionally with a short mucro, the base rounded, the margin revolute; panicles 3 or 4, shorter than or equalling the petioles, densely brown-sericeous or strigose; calyx 2–3 mm. in diameter, deeply lobed, densely brown-sericeous, the lobes ovate, obtuse or acute at the apex, 1 mm. long; petals ovate-lanceolate, 4.5 mm. long, 1.5–1.7 mm. broad at maturity, densely sericeous or pilose

outside, inside red-brown-lanate; stamens 4–4.5 mm. long, the anthers ovate-oblong, 1–1.7 mm. long, the thecae flat or slightly recurved at the tip, approximate at the apex, frequently widely separated at the base, the connective fleshy, oblong, obtuse or rounded at the apex, rounded or cordate at the base, attached to the filament dorsally near the base; ovary globose, 1.2 mm. in diameter at anthesis, densely hirsute above, with a sterile glabrous area differentiated at the base, 3-loculed; styles 2.5–2.6 mm. long, glabrous, terminal or slightly eccentric, the apex rounded or slightly 3-lobed; fruit unknown.

TYPE COLLECTION: *Sellow* (Hook. Herb., not seen), from Brazil.

BRAZIL. Bahia: *Blanchet 1702* (FM, NY). Pernambuco: Prozeres, sandy soil of littoral zone, *Pickel 3125* (FM, G); Oct. 1930, *Pickel s.n.* (FM, G).

I have seen no authentic material of this species. I have been unable to find any other reference than Miers' to the Sellow specimen in literature and cannot determine in what state of Brazil it was collected.

Engler (in Mart. Fl. Bras. **12**(2): 45. 1872) referred this species with question to the synonymy of *E. acuminatum*. This latter species, however, has a glabrous ovary, ovate leaves with long acuminate apices which do not recurve, and is found in British Guiana and Amazonas, Brazil. *E. affine* has a pilose or hirsute ovary, smaller ovate leaves, which are acute or tapering at the apex or rarely with a short mucro, and the apex is usually curved downward as Miers mentions. Engler (l. c.) has referred the Blanchet specimen (1702) to *E. jagifolium*; however, in all its characters it is in agreement with *E. affine*.

10. ***Emmotum conjunctum*** sp. nov.

Arbor; ramulis subangulatis cinereo-pubescentibus; petiolis subteretibus 1–1.3 cm. longis sulcatis; laminis oblongis vel ellipticis, 7–8 cm. longis, 2.5–3.5 cm. latis, supra nitidis glabris nervo medio sulcato notatis, subtus pallidis breviter sericeis, nervis lateralibus 12 vel 13 subprominentibus pinnatis parallelibus marginem versus arcuatis anastomosantibus, apice acutis cum mucroni 5–9 mm. longo deflexo ornatis, basi rotundatis, margine revolutis; paniculis 5–7 fasciculatis brevibus 4–10 mm. longis breviter sericeis; calyce campanulato sericeo 2 mm. diametro, lobis ovatis 1 mm. altis; petalis lanceolato-oblongis, 6–6.3 mm. longis, 2 mm. latis, extus dense sericeis, intus cum costa rufo-lanata instructis; staminibus 5–5.4 mm. longis, antheris ovato-oblongis 1.5–1.8 mm. longis, thecis planis, filamentis crassulis 1 mm. latis; ovario globoso 3-loculato 1 mm. diametro, sub anthesi 1–1.3 mm. longo, supra dense hirsuto, ad basim glabro; stylo subterminali 3.6–4.0 mm. longo glabro; fructu ignoto.

ILLUSTRATION: Plate 3.

VENEZUELA. Amazonas: Mt. Auyan-Tepui, alt. 1100 m., Dec.–Jan. 1937–38, *Tate 1354* (US, TYPE).

The bicolorous leaves with strongly reflexed apices and slightly curved midribs, together with the short inflorescences, allow this species to be readily recognized. The leaf-apex is curved downward and most of the leaves are folded when pressed. This character is also present in *E. affine*. All other species of *Emmotum* examined have arcuate veins with the ends free, while *E. conjunctum* has the numerous veins straight, pinnate, parallel

but slightly arcuate near the margin, and noticeably anastomosing. The flower-parts are slightly larger and more pubescent than in other species. The style is essentially terminal in the flowers seen.

The closest relationship of this species is probably with *E. fulvum*, from the vicinity of Mt. Roraima.

11. *Emmotum fagifolium* Desv. ex Hamilton, Prod. Fl. Ind. Occ. 29. 1825; Miers, Ann. Mag. Nat. Hist. II. **10**: 179. 1852, Contrib. Bot. **1**: 109. 1851-61; Engler in Mart. Fl. Bras. **12**(2): 45. 1872; Le Cointe, Arvores e Plantas Uteis, 457. 1934. *Pogopetalum acutum* Benth. Lond. Jour. Bot. **2**: 377. 1843; Miers, Ann. Mag. Nat. Hist. II. **10**: 176. 1852.

Trees, the branches terete, brown-tomentose to short-brown-sericeous, becoming glabrate; petioles 1-1.5 cm. long, puberulent, becoming glabrate, sulcate above; lamina lanceolate-oblong to elliptic or rarely ovate-oblong, 9-18 cm. long, 4-8 cm. broad, tomentose above, becoming glabrate, frequently shining, concolorous, brown-sericeous or tomentose, and becoming glabrate below, the midrib sulcate above and prominent below, the veins 9-11 pairs, slightly sulcate above, prominent below, tomentose or long-sericeous, arcuate and free at the ends, the apex abruptly acute, rarely acuminate, extending to a mucronate point 1-1.5 cm. long, the base rounded or subtruncate, the margin slightly revolute; panicles much shorter than the petioles, white-sericeous; calyx campanulate, 2 mm. in diameter, 1-1.5 mm. high, short-white-sericeous, the lobes triangular, usually obtuse at the apex; petals lanceolate-oblong, 4.5-6 mm. long, 1-1.4 mm. broad, densely sericeous outside, lanate inside; stamens 4.5-6 mm. long, the anthers oblong or ovate-oblong, 1-1.2 mm. long, the thecae flat, equally separate at the base and the apex or slightly cordate at the base; pistil symmetrical, 4.5-6 mm. long, the ovary globose, 1-1.5 mm. in diameter at anthesis, hirsute above, with a differentiated glabrous area at the base, the style glabrous, 2-4.5 mm. long, the apex rounded, rarely 3-lobed; fruit unknown.

TYPE LOCALITY: "Guyana" (Hamilton).

ILLUSTRATIONS: Miers, Contrib. Bot. **1**: t. 21. 1851-61; Baillon, Hist. Pl. **5**: 278. 1874; Baillon, *Adansonia* **2**: t. 9. 1862, as *Pogopetalum acutum*.

FRENCH GUIANA. *Leprieur* 264 (FM); *Martin* ex Hook. Herb. (G). BRITISH GUIANA. Mazaruni, *Sandwith* 1547 (NY, US); Demerara River, *Jenman* 4867 (NY), 6280 (NY); Demerara River, *Schomburgk s.n.* (C); Barima River, *La Cruz* 3375 (C, FM, G, NY, US); Mouth of Kako river, upper Mazaruni, *Pinkus* 193 (NY). BRAZIL. Pará: Peixeboi, *Sigueira* 9652 (US); Pará, *Ducke* 15696 (US), 15805 (US). Maranhão: *Snethlage* 341 (FM).

VERNACULAR NAMES: Bois d'Agouti, harriromanabading, muirachimbé, muira-ximbé, pao de ramo.

Miers refers to the glabrous base of the ovary as an "adnate cup-shaped disk"; however, the tissue forming this sterile area, although differentiated from the rest of the ovarian wall, is not free as in *Mappia* and is a portion of the pistil. I do not believe this should be called a disk.

The pubescence of the ovary is reduced in amount in several specimens I have seen. In the collections by Martin and Sandwith only a dense ring of hairs remains around the base of the style, the rest of the ovary being glabrous.

12. *Emmotum fulvum* sp. nov.

Arbor; ramis teretibus dense et crispe cinereo-pilosis aut hirsutis; petiolis angulatis 1.5 cm. longis crassis late sulcatis dense hirsutis; laminis ellipticis, 10–14 cm. longis, 4.5–6 cm. latis, supra glabris nitidis nervo medio sulcato hirsuto notatis, subtus dense pilosis aut hirsutis nervum medium prominentem et nervos laterales 7 prominentes arcuatos ad apicem liberos gerentibus, apice acutis mucronatis. basi rotundatis, margine revolutis; paniculis 1–1.5 cm. longis dense fulvo-pilosis aut tomentosis; calyce campanulato, 2 mm. diametro, 2 mm. alto, dense fulvo-piloso, lobis ovatis acutis 1 mm. longis; petalis ovato-lanceolatis, 5.8–6.1 mm. longis, 1–1.2 mm. latis, extus dense fulvo-pilosis, intus fusco-lanatis; staminibus 5–5.3 mm. longis, antheris oblongis 1–1.3 mm. longis, thecis planis; ovario globoso 2 mm. diametro dense fulvo- vel argenteo-hirsuto; stylo subterminali glabro 3–3.4 mm. longo; fructu drupaceo submaturo globoso 1 cm. diametro sparse hirsuto, sarcocarpio 1 mm. crasso, endocarpio osseo 1-loculato, semine in quoque loculo solitario.

ILLUSTRATION: Plate 4.

VENEZUELA. Amazonas: Arabupu, vicinity of Mt. Roraima, alt. 4200 ft., Dec. 21, 1938, *Pinkus* 87 (FM ISOTYPE, NY TYPE).

Pinkus reports this plant to be a tree 36 feet high, with a trunk diameter of 8 inches. The calyx and corolla are covered with a yellow-brown pubescence and the anthers and pistil are said to be white. It occurs in mixed forests on clay soil.

This species is near *E. jagifolium* and *E. conjunctum*. It differs from both of these and is characterized by having a dense yellow-brown pubescence on the perianth-parts as well as on the axis and bracts of the inflorescence, and by lacking the conspicuous sterile fleshy base to the pistil.

SPECIES EXCLUDED

EMMOTUM APOGON Griseb. Abhandl. Ges. Wiss. Goetting. **24**: 149. 1879 = *Citronella apogon* (Griseb.) Howard.

EXPLANATION OF PLATES

PLATE I

Emmotum nudum Howard (*Ducke 11367*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Glabrous pistil with a basal ring of differentiated sterile tissue, $\times 10$; 3-5. Lateral, abaxial, and adaxial views of the stamens with dithecal anthers, $\times 10$; 6. Pubescent calyx, $\times 10$; 7. Side view of a mature drupe, $\times 1$; 8. Basal view of a mature drupe showing the lobed margin and the minute persistent calyx, $\times 1$; 9. Diagrammatic cross-section of the ovary showing the three eccentric locules with two ovules in each locule, $\times 15$; 10. Abaxial view of the petal taken from a mature bud, $\times 12$; 11. Lateral view of a petal showing the lanate pubescence on the raised midrib, $\times 9$; 12. Adaxial view of a petal after anthesis, $\times 9$.

PLATE II

Emmotum floribundum Howard (*Klug 1212*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2, 3. Adaxial and lateral views of petals after anthesis, $\times 8$; 4. Glabrous pistil, $\times 12$; 5-7. Lateral, abaxial, and adaxial views of stamens, $\times 10$. Fig. 7 shows the longitudinal dehiscence of the anther-sacs along the junction with the connective.

PLATE III

Emmotum conjunctum Howard (*Tate 1354*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2, 3. Adaxial and lateral views of petals after anthesis, $\times 7$; 4. Pistil showing the hirsute ovary, the differentiated glabrous basal sterile ring of tissue, and the glabrous style, $\times 10$; 5. Calyx, $\times 7$; 6-8. Lateral, abaxial, and adaxial views of the stamens, $\times 9$.

PLATE IV

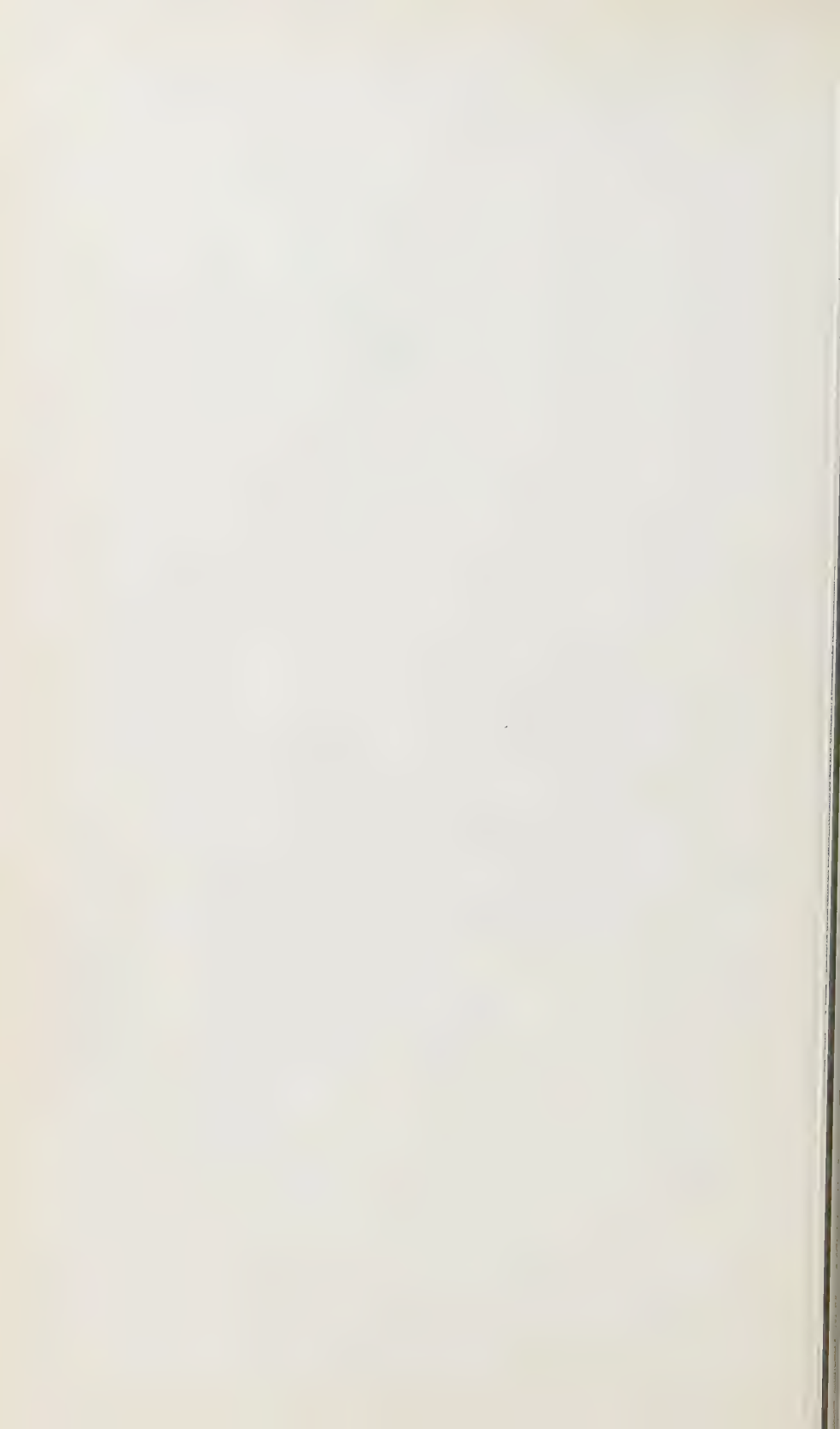
Emmotum fulvum Howard (*Pinkus 87*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Pistil showing the hirsute ovary with an undifferentiated base, $\times 12$; 3, 4. Adaxial and lateral views of a stamen, $\times 9$; 5. Pedicel and calyx showing the floral articulation immediately subtending the calyx and the bracts on the pedicel, $\times 7$; 6, 7. Diagrammatic cross and longitudinal sections of the ovary showing the three eccentric locules, each with two anatropous ovules pendent from near the apex, $\times 10$.

GRAY HERBARIUM,
HARVARD UNIVERSITY.



EMMOTUM NUDUM Howard





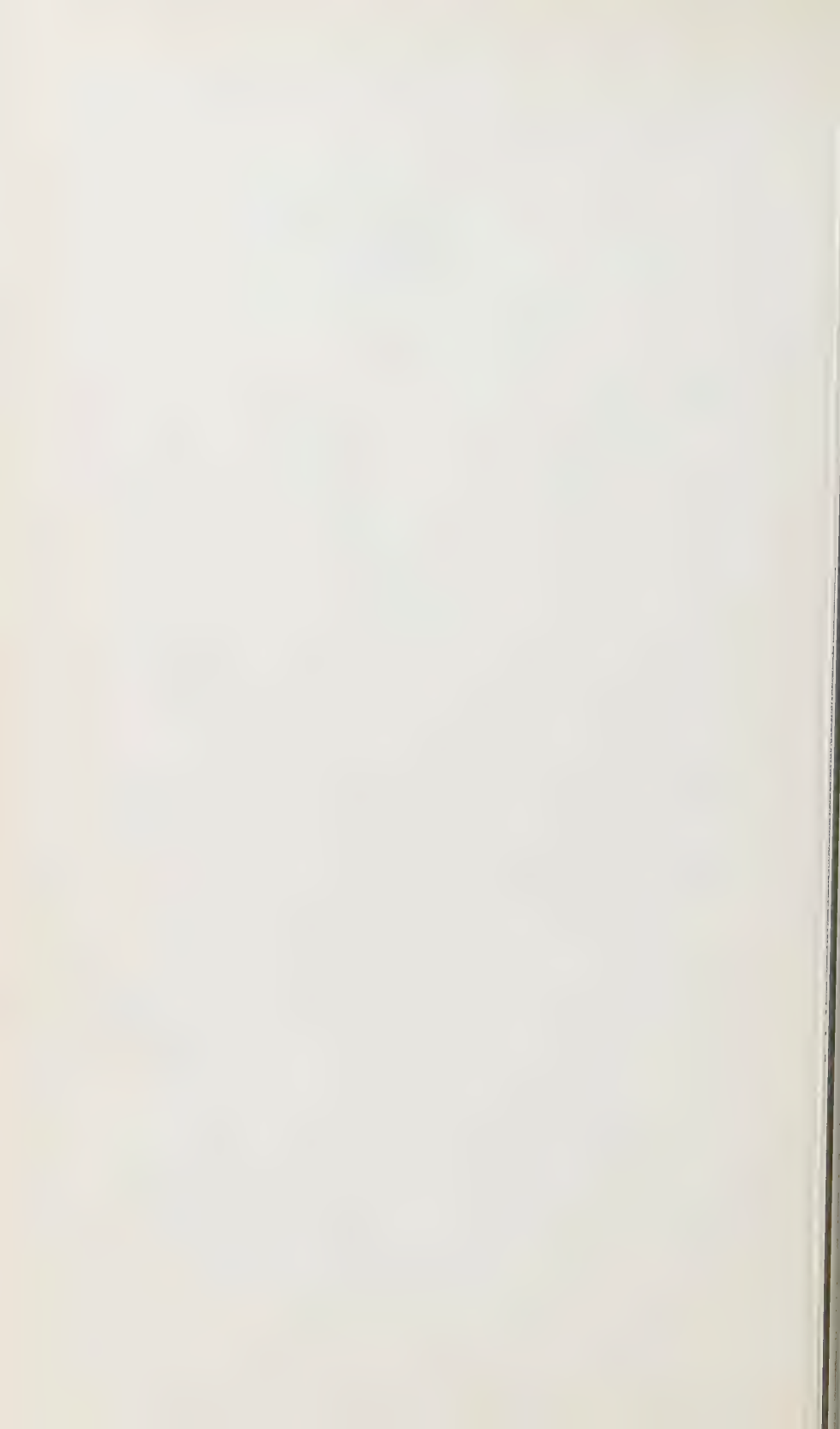
EMMOTUM FLORIBUNDUM Howard



EMMOTUM CONJUNCTUM Howard



EMMOTUM FULVUM Howard



NEW AND CRITICAL EUPHORBIACEAE FROM
THE TROPICAL FAR EAST

LEON CROIZAT

THE material dealt with in this paper belongs to the herbarium of the Arnold Arboretum of Harvard University and has been studied in the course of normal herbarium routine. In a recently published contribution on *Croton* L. in Guatemala (in Publ. Field Mus. Nat. Hist. Bot. Ser. **22**: 446-448. 1942), as well as in another on certain Euphorbiaceae of Texas (in Bull. Torrey Club **69**: 446-447. 1942), I have found reason to comment on the speciation taking place in this genus in the American range. Precisely the same order of facts is discernible in Asia that obtains on our continent; species of *Croton* which are identical or almost identical in their foliage turn out to have different ♀ flowers and capsules when carefully studied. Likewise, species that are apparently unrelated appear, whenever material is available, to be connected by endless intermediates which differ, each in its turn, by sums of minor characters if not of sheer intangibles. To deny recognition to such forms is neither possible or advisable, but to place them accurately, whether as species, subspecies, or varieties proves now impossible. As a compromise, which remains to be tested by field work and experimental cultivation, I have accepted for *Croton* a comparatively narrow specific concept in publishing some of the species in this paper.

CROTON Linnaeus

Croton adumbratus sp. nov.

Frutex videtur vel arbuscula. Innovationibus furfuraceo-lepidotis, rufescentibus vel subargenteis. Foliis ovato-ellipticis vel elliptico-lanceolatis, apice cuspidatis, basi cuneatis obscure auriculatis, 8-20 cm. longis, 3-8 cm. latis, in sicco supra brunneis, glabris, subtus totis lepidotis, lepidibus centro brunneis quapropter indumento opaco, nervis primariis ca. 8-jugis, primo jugo adscendente caeteris patentibus, omnibus sub margine anastomosatis, sat tenuibus; petiolo 1.5-5 cm. longo, glandulis posticis 2 subsessilibus, patelliformibus. Inflorescentia subsimplici, spicata, 2-sexuali. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello in anthesi ca. 3 mm. longo. Floribus ♀: perianthio ovarium tenellum totum occultante ca. 6 mm. magno, pedicello in anthesi ca. 3 mm. longo, sub fructu ad 5 mm. longo, lobis ligulatis, apice subcucullato-incrassatis, disco e glandulis 5 discretis; ovario globuloso ca. 2 mm. magno, lepidoto, stylis iterum partitis, capsula rufescente tomentella, indumento detergibili, globulosa, sulcata ca. 7 mm. magna.

MALAY PENINSULA: *Griffith s.n.* (TYPE); *Maingay* 1378; *Griffith* 4777. SUMATRA: East Coast, *H. S. Yates* 754; *Rahmat si Toroës* 1426; *Rahmat si Boëea*; *Krukoff* 239 in 1930; *Krukoff* 4022, 4281 in 1932.

Griffith 4777 is cited by Hooker, Fl. Brit. Ind. **5**: 391. 1887, under *Croton erythrostachyus*. The specimens which I have seen under this number are

a mixture of *C. erythrostachyus* Hook. f. and *C. adumbratus*. The Griffith material from Malacca was correctly indicated as "*Croton* sp. nov.," but was later misdetermined as *C. argyratus* Bl. Hooker evidently confused under *C. argyratus* at least two species, Blume's authentic plant and *C. adumbratus*, it being likely that his concept (Fl. Brit. Ind. 5: 385. 1887), is based upon the latter rather than upon the former. My understanding of *C. argyratus* rests upon the following collections: (1) *Koorders 15685 B*, from the range of the classic locality ("ad montem Parang Prov. Tjanjor," Blume, Bijdr. 602. 1825 — apparently Mt. Karang near Tjiandoer of modern maps); (2) *Collector unknown*, Java, Sept. 1930, a duplicate from the Paris herbarium, probably wrongly dated, and possibly a century older than the year given by the label implies; (3) *Bangham 1092*, Sumatra, road from Kaban Dtjake to Kata Tjane; this collection is in fruit, the rather hard capsule being about 1.5 cm. long and broad, thus tallying with the size, "capsulae 15 mm. longae" given by Mueller-Argoviensis (in DC. Prodr. 15[2]: 527. 1866) for the fruit of *C. argyratus* var. *genuinus*. Despite a superficial resemblance with *C. argyratus*, this new species differs from it in the much weaker and smaller capsule and in minor details of the indument and of the ♀ calyx, being nearer, on the whole, to *C. potabilis* Croizat. It is probable that the majority of the references to *C. argyratus* in the Malayan peninsula apply to *C. adumbratus*.

***Croton biaroensis* sp. nov.**

Frutex vel arbor. Innovationibus plus minusve lepidotis, indumento citius deciduo. Foliis late ellipticis vel ovato-ellipticis, apice sensim acuminatis, basi cuneatis vel cuneato-rotundatis, 10–16 cm. longis, 4–5 cm. latis, in sicco lutescentibus vel brunnescentibus subcoriaceis firmis glabratibus, margine primo intuitu integris parcius repando-dentatis, nervis primariis patentibus, obscure anastomosantibus 8–11-jugis, petiolo crassiusculo glabro, 2–2.5 cm. longo, glandulis posticis 2 sessilibus parvis. Inflorescentia simplici, gracili, ca. 10–12 cm. longa, 2-sexuali. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello ca. 2 mm. longo. Floribus ♀: perianthio 3 mm. longo, 3.5–4 mm. lato, pedicello ca. 2 mm. longo, lobis lanceolatis vel ellipticis acuminatis crassiusculis integerrimis, 2.5 mm. longis, 1 mm. latis; ovario globuloso, ca. 2 mm. magno, luteo-lepidoto, lepidibus sat latis fructu ineunte in epicarpio dissitis, stylis 3 dorso valde lepidotis ca. 2 mm. longis, tertio infero connatis, apice bifidis, planis, brunneis.

BIARO (north of Celebes): *E. Nielsen 812*, 1929 (TYPE). CELEBES: Minahassa, Bojong, *Warburg 15554*, 1898.

The Warburg collection was distributed as *C. laevifolius* Bl., which this new species but superficially resembles, as it is near *C. glabrescens* Miq., and probably also related to *C. erythrostachyus* Hook. f. It appears to be a localized endemic with affinities toward *C. leytenensis* Croiz. that require further study.

***Croton oreoborneicus* sp. nov.**

Arbor videtur vel frutex magnus ad 40 ped. altus. Innovationibus glabratibus, valde immaturis pilis pluriradiatis grossis brunneis obsitis, serius glabris. Foliis ellipticis, apice late acutatis, basi longius cuneatis, 8–20 cm.

longis, 3–6 cm. latis, in sicco pallide olivaceis, firme chartaceis, glabris, nervis primariis ca. 8-jugis, primo jugo abrupte caeteris late adscendentibus, margine primo intuito integro, sub lente haud obvie denticulato vel repandulo; petiolo gracili, 1–6 cm. longo, glabrato, glandulis posticis 2 sessilibus patelliformibus. Inflorescentia ob cymas vulgo plures subspicatas terminales habitu paniculata sat ampla. Floribus ♂ in holotypo nullis, at videtur (e *Clemens* 20335) delicatis, vix ultra 2 mm. magnis, petalis sepalis aequilongis, pedicello subfiliformi ca. 3 mm. longo. Floribus ♀: perianthio ca. 2 mm. lato, 2–3 mm. longo, glandulis disci 5 extus tumescentibus perspicuis quapropter lobis basi primo intuito incrassatis, lobis ipsis triangularibus 1.5 mm. longis, 1 mm. latis, petalis nullis; ovario luteolepidoto 1.25 mm. longo, 2 mm. lato, stylis 3 fere e basi liberis, quove 0.75 mm. integro, dein 1.75 mm. partito; fructus delapsi coccis ad 7 mm. longis, delicatis, columella ad 5 mm. longa, seminibus brunneis, apice verruculosus, caruncula lineari ad hilum excurrente, ca. 5 mm. longis, 4 mm. latis.

BRITISH NORTH BORNEO: *Agama* 568, 1918 (TYPE).

Here to all appearances also belong: Sarawak: *Native Collector* 1744; Kina-bagatan: *Evangelista* 1006, 1929; Sarawak: Mt. Poi: *Clemens* 20335, 1929.

Few other species are so critical as *C. laevifolius* Bl., for around it, as around *C. argyratus* Bl. and many other forms of *Croton*, are countless entities which may appear almost identical in their gross morphology but are basically different in the characters of their ♀ flowers and fruits. It proves impossible for this very reason to accept *C. oblongum* Burm. f. as the legitimate binomial of the entity usually recognized as *C. laevifolius* Bl. before having made a critical study of the plant that might be preserved in the herbarium of Burman at Geneva under this name. Corner is justified, to all appearances, in treating (in Gard. Bull. Straits Sett. **10**: 294. 1939) *C. Griffithii* Hook. f. and *C. confusum* Gage as synonyms of *C. laevifolius*, the material I have seen supporting his conclusion. *Croton tiglioides* Bl., listed with doubt by J. J. Smith (Meded. Dept. Landb. **10**: 341. 1910) in the synonymy of *C. laevifolius*, seems actually to belong where Smith puts it, to judge from a specimen so named which I saw in the Paris herbarium and is now represented in our collections by a fragment, the gift of Prof. Henri Humbert.

Croton oreoborneicus essentially differs from *C. laevifolius* in the apparently much larger disc of the ♀ flower and in some intangibles of habit and foliage. It remains to be seen whether these characters are specific. The publications of varieties and trinomials is not advisable at this stage of investigation on account of the reasons briefly outlined in the introduction to this paper.

***Croton tawaoensis* sp. nov.**

Videtur arbor. Innovationibus grosse parciusque stellato-tomentosis, citius glabrat. Foliis late ellipticis vel ellipticis, interdum subovalibus, apice basique plus minusve longe acutatis vel cuneatis, 10–24 cm. longis, 3.5–8 cm. latis, glabris, in sicco pallide olivaceis vel badiis, firme chartaceis vel subcoriaceis, margine subintegro revolutis, nervis primariis 6–8-jugis utrinque tenuibus late adscendentibus, anastomosatis; petiolis longitudine valde ludentibus, 1–6 cm. longis, glandulis in petioli apice anticis 2 brevis-

sime stipitatis vel baculiformibus. Inflorescentia floribusque in holotypo haud suppeditantibus: capsula visa juniore, trigona, coccis apice gibbosis, solutis ad 8 mm. longis, endocarpio firmo osseo, exocarpio subtili toto ochraceo valde verrucoso stellato-tomentoso vel furfuraceo-lepidoto, semine ellipsoideo, ca. 7 mm. longo, 4–5 mm. crasso, sub lente acri testa verruculosa vel striata ad carunculam indumento peculiari e trichomatibus stellatis lutescentibus induta.

BRITISH NORTH BORNEO: Tawao, Elphinstone, A. D. Elmer 21559, 1923 (TYPE); distributed as *C. oblongum* Burm. f.

It would be impossible to separate this species from *C. laevifolius* Bl. and the forms in its vicinity but for the nature of the fruit. As stated previously, the foliage is practically the same and the flowers mostly differ in minute characters in the plants of this and allied groups. However, the epicarp sharply differs; in *C. laevifolius* it is smooth and sparingly stellate-tomentose to glabrous, while it is rough and verrucose, thickly tomentose to scurfy in *C. tawaoensis*. Such a difference I accept as fully specific, for to neglect it would call for the conclusion that the whole Sect. *Gymnocroton* Baill., which ranges from Assam, in N. E. India, to the Fiji Islands and Australia, consists of but one species. I suspect that Villamil 379, also collected in British Borneo and distributed as *C. laevifolius*, may prove to be *C. tawaoensis*; the indumentum on its ovary is thicker and coarser and has a much darker color than is usual for *C. laevifolius*.

***Croton avellaneus* sp. nov.**

Frutex vel arbor videtur ex affinitate proxima *C. argyrati* Bl., quocum notis vegetativis totis optime quadrat, licet foliis 6–10 cm. longis, 3–7 cm. latis, supra brunneis subtus totis fusco-argenteis, innovationibus lepidibus cupreis plus minusve dense indutis. Floribus haud visis: pedicello sub fructu crassiusculo ad 1 cm. longo, lobis perianthii ellipticis apice dilatatis integerrimis ad 5–6 mm. longis, columella sat gracili ad 10 mm. longa; capsula basi coarctata apice applanato-subtruncata, ca. 12 mm. longa, 10 mm. crassa, in coccorum dorso atque in dissepimentibus quoad visa lineata vel costulata revera haud trigona, epicarpio glabrescente brunneo, sat tenui, secedibili, endocarpio fragili; semine brunneo opaco scaraboideo, 9 mm. longo, 7 mm. lato, caruncula umbonata in arillum circumcircum confluyente, valde depressa, albo-cincta, testa grosse at haud profunde costulato-rugosa.

PHILIPPINE ISLANDS: Sulu Archipelago: Tawitawi, Ramos & Edaño 43977, 1924 (TYPE).

The Bornean plant represented by Castro & Melegrito 1565, 1923, from Banguay Island, British North Borneo, and J. & M. S. Clemens 20099, 1929, from Mount Poi, British North Borneo, probably belongs here despite slight differences in the size of the capsule. Elmer 21201, also from British North Borneo (Tawao), almost certainly belongs to *C. avellaneus*. Its ♀ flower has a perianth which is manifestly larger and coarser than that of *C. argyratus*, that is about 7 mm. long and 10 mm. wide, against a length of 4 mm. and a breadth of 6 mm. for Blume's species. The capsule of the type, Ramos & Edaño 43977, is essentially coarser and larger than that of *C. argyratus*.

***Croton babuyanensis* sp. nov.**

Frutex videtur vel arbuscula. Innovationibus argillaceo-tomentosis, colore cupreatis cortice vetustiore albicanti. Foliis late ellipticis, apice breviter acuminatis, basi rotundato-cuneatis, integris, supra glabris brunneis, subtus conferte argenteo-lepidotis, nervis interdum laetius coloratis, firme chartaceis, primariis 4–6-jugis adscendentibus, petiolo 1–3 cm. longo glandulis posticis sessilibus obscuris. Inflorescentia simplici 2-sexuali spicata. Floribus ♂ ignotis. Floribus ♀: perianthio ca. 4 mm. lato et 3 mm. lato, *ovarium haud includente* (qua nota a speciebus in *C. argyrati* affinitate primo intuitu abhorret), pedicello ca. 3 mm. longo, lobis triangulari-acuminatis vel rarius ellipticis interdum apice incrassatis, costulato-venosis, ovario 3 mm. crasso, 2.5 mm. longo, cupreato-lepidoto, stylis visis valde mancis.

PHILIPPINE ISLANDS: Babuyan Group: Island of Dalupiri, Bartlett 15086, 1935 (TYPE); distributed as *C. argyratus* Bl.

A strong species, with a perianth that fails to inclose the ovary. Its characters suggest the Indo-Chinese *C. kongensis* Gagnepain, and its only known ally in the Philippines is *C. Novae-Astigis* Croiz., from the Province of Nueva-Ecija in Luzon, which appears to be less of a xerophyte and has ♀ flowers with much longer pedicels.

***Croton Novae-Astigis* sp. nov.**

Arbuscula vel frutex. Innovationibus lepidoto-tomentosis vel lepidotis rubiginosis, citius glabratiss. Foliis late ovatis, breviter vel brevissime apiculatis vel cuspidatis, basi obscure cordatis rotundatis vel subpeltatis, margine obiter distanctaque sub lente serratis, firme chartaceis, 12–15 cm. longis, 3.5–5 cm. latis, supra brunneis glabratiss vel glabris, subtus argenteo-lepidotis, nervis utrinque ca. 7-jugis rubiginosis, primo jugo ramoso; petiolo sat crasso, 2.5–4.5 cm. longo, apice glandulis 2 posticis optime sessilibus supra limbi parte peltata sitis insignito. Inflorescentia simplici spicata. Floribus ♂ haud visis. Floribus ♀: perianthio vix 3 mm. longo ovarium haud includente, 4 mm. lato, pedicello evidenti ad 5–7 mm. longo, lobis lanceolatis, breviter acuminatis secus medium nervosis, carnosulis, disco e glandulis 5 sat magnis discretis, impressis, ad tori centrum positiss, ovario cylindrico-ovoideo ca. 2.5 mm. magno, toto lepidoto, stylis 3 ad basim imam partiss quapropter primo intuitu ut videtur 6, ca. 2 mm. longis, carneis neque nigris, dorso sublepidotis.

PHILIPPINE ISLANDS: Luzon: Province of Nueva-Ecija, Mt. Napu, Alcasid & Edaño 5341, 1939 (TYPE); distributed as *Mallotus ricinoides*.

Related to *C. babuyanensis*, described above, but having larger leaves, a somewhat different indumentum, and, primarily, a much longer pedicel under the ♀ flower. The specific epithet is the Latinized version of the name of the Province from which the type-collection has come.

***Croton batangasensis* sp. nov.**

Frutex vel arbuscula. Innovationibus griseo-tomentosis vel argenteo-sublepidotis, frequentius tomentosis. Foliis plus minusve late lanceolato-ellipticis, apice breviuscule acuminatis, basi rotundatis subauriculatis, auricula altera interdum longiore, 5–9 cm. longis, 3.5–5 cm. latis, supra brunneis glabris, subtus griseo-canescens, indumento sublepidoto, margine primo intuitu subintegro sub lente sat crebre repando-serrato, nervis pri-

mariis ca. 7–9-jugis, primo jugo valde diminuto, sequente valde adscendente ramoso, caeteris primis adscendentibus demum sub apicem laminae latius patentibus; petiolo tomentoso 1.5–3.5 cm. longo, apice glandulis 2 posticis sessilibus insignito. Inflorescentia simplici spicata. Floribus ♂ haud visis. Floribus ♀: perianthio cupulato, ovarium totum occultante ca. 5 mm. magno, lobis imbricativis ad basim nempe agglutinatis, ellipticis, ca. 3 mm. longis et 1.5 mm. latis, intus valde laqueato-venosis, glandula ad basim auctis squamiformi, disco dissito, petalis nullis, ovario globuloso ca. 2 mm. magno tomentello-lepidoto, stylis 3 in columnam brevissimam (0.75 mm.) primo connatis, dein liberis, bis dichotomis, crure summo 2.5–3 mm. longo; capsula submatura lepidota ca. 6 mm. magna, columella gracili 5 mm. longa.

PHILIPPINE ISLANDS: Luzon: Province of Batangas, *Ramos* 22371, 1914 (TYPE); distributed as *C. argyratus* Bl. var.

Quite unlike *C. argyratus* Bl. and reminiscent on the whole of *C. budopen-sis* Gagnep. from Indo-China.

***Croton cotabatensis* sp. nov.**

Arbor parva vel frutex intricatus videtur. Innovationibus lepidibus cupreis primo indutis, citius glabrat. Foliis habitu, textura, indumento, forma vix ab illis *C. argyrati* Bl. eruendis, ca. 12–15 cm. longis, 3.5–5 cm. latis, subtus totis lepidotis, nervis primariis ca. 7-jugis. Floribus ♂ haud visis. Floribus ♀: perianthio ovarium totum occultante, ca. 7 mm. longo, 7 mm. lato, pedicello vix 2 mm. longo, lobis fere ad basim partitis ligulatis carnosulis, intus stellato-tomentosis, ca. 6 mm. longis et 2 mm. latis, petalis setaceis manifestis, ovario lepidoto, globuloso, ca. 2 mm. magno, apice subtruncato-dilatato subinde in columnam stylarem evidentem ad 1 mm. longam abeunte, crure quove partito ad 4–5 mm. longo.

PHILIPPINE ISLANDS: Mindanao: District of Cotabato, *Miranda* 18271, 1912 (TYPE).

Here belongs *Tarrosa*, *Miranda & Rafael* 18794, 1912, from the same district and, to all appearances, *Robinson* 11829, 1910, from the District of Zamboanga. The characters of the ♀ perianth are not those of *C. argyratus* and *C. Quisumbingianus*. From *C. cupreus* Elm. this new species appears to differ in the much longer and not sessile styles and in the larger perianth; a comparison of specimens in full fruit is desirable.

***Croton Quisumbingianus* sp. nov.**

Arbor vel arbuscula innovationibus cupreato-argenteis, cortice adultiore griseo rugoso cicatricoso. Foliis cum illis *C. cotabatensis* fere ad assem congruentibus, floribus ♀ autem aliis, scilicet: perianthio gracilius longiusque pedicellato, pedicello ad 5 mm. longo, lobis minoribus, magis delicatis, inde perianthio toto ca. 6 mm. longo et 5 mm. lato neque 7–8 mm. longo latoque, petalis nullis vel (forsan) subnullis, ovario depresso-globoso, 2 mm. longo, 3 mm. lato, stylis e basi ipsissima liberis neque in columnam evidentem connatis, crure quove primum ca. 1.5 mm. integro, dein dichotomo, crure summo 2.5–3 mm. longo.

PHILIPPINE ISLANDS: Leyte: *Wenzel* 1250, 1915 (TYPE).

Here also apparently belongs *Wenzel* 1538, 1915, from the same island. This is a very distinct species, with a delicate perianth, quite close to *C. potabilis* Croiz. from Indo-China, but not nearly allied with other species

of the Philippine Islands. I dedicate it to Dr. Eduardo Quisumbing of the Bureau of Science, Manila, to whom I am indebted for the communication of holotypic material and important data.

Croton cupreus Elm. in Leaf. Phil. Bot. **4**: 1281, as *C. cuprea*. 1911.

Croton argyratus Merr., Enum. Phil. Fl. Pl. **2**: 425. 1923, *p.p.*, non Blume.

Elmer's description is long but lacking in the essential data of the ♀ flower and the fruit. A dissection of a young fruit on an isotype, *Elmer 13236*, 1911, reveals that the ♀ perianth has petals matching those of *C. cotabatsensis* but with lobes which are short and slender (about 3 mm. long and 1.5 mm. broad), and with styles that do not form a column but branch from the base and are not over 2 mm. long. The columella of a nearly ripe or ripe fruit is delicate, only 5 mm. long. In all these characters *C. cupreus* disagrees with *C. argyratus*. The foliage is thickish, with revolute margins, such as is frequently found in the xerophytic forms of the genus, and its "feeling," if not its color, is indeed reminiscent of *C. cascarilloides* Raeusch. (*C. Cumingii* Muell. Arg.), to which Elmer compares it.

Croton argyratus Bl. Bijdr. 602. 1825; Muell. Arg. in DC. Prodr. **15**[2]: 526. 1866 (saltem quoad var. *genuinum*).

I have not seen specimens from the Philippine Islands which I can bring under this species. *Croton avellaneus* Croiz., described elsewhere in this paper, is the endemic to these islands which is nearest Blume's species, and it may be easily possible to treat it as a variety of *C. argyratus* by accepting a concept of specific limits which I am not ready to entertain for this group and region at present.

The exceedingly crude figure of *Croton racemosum* given by Burman f. (Fl. Ind. 206 [sphalm.: 306]. *pl.* 62, 2. 1768) suggests, in the shape of the leaf and in the perianth-like calyces, the habit of certain states of *C. argyratus*, and a study of the type that might be preserved in the herbarium of Geneva is advisable. The description of what Burman accepts as the typic form of the binomial consists merely of the note: "*Croton (racemosum)* foliis ovatis subserratis tomentosis, racemis terminalibus nudis . . . ex Java." As is known, the leaves of *C. argyratus* are not infrequently tomentose rather than silvery-lepidote underneath.

Croton rectipilus sp. nov.

Frutex vel arbuscula magnitudine ignota. Innovationibus hispido-pubescentibus, trichomatibus pilo vulgo centrali elongato setuloso-stellatis, serius glabris brunneis. Foliis elliptico-lanceolatis, in sicco olivaceo-dicoloribus vel brunneis subconcoloribus, utrinque acuminatis, 7–13 cm. longis, 2.5–5 cm. latis, glabris vel glabris, tenellis dissite tomentello-setulosis, margine primum ciliato, dein glabro, repandulo vel subintegro vel integro, nervis primariis 7–10-jugis adscendentibus, petiolo 1–3.5 cm. longo, gracili, hispido-tomentoso, apice glandulis 2 sessilibus patelliformibus aucto. Inflorescentia evoluta haud visa. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello 2.5 mm. longo, lobis 2 mm. longis, 1 mm. latis, petalis (ut videtur) nempe ligulis hyalinis ciliatulis ad 1 mm. longis, staminibus ca. 10.

PHILIPPINE ISLANDS: Luzon: Province of Batangas, *Ramos 22356*, 1914 (TYPE).

Mueller Argoviensis cites specimens of Cuming and Llanos (in DC. Prodr. 15[2]: 621. 1866) for his *C. Verreauxii* Baill. var. *angustifolius*, which may or may not be the same as *Ramos* 22356, listed by Merrill (Enum. Phil. Fl. Pl. 2: 427. 1923) under Mueller's trinomial. Mueller's concept of *C. Verreauxii* is manifestly too comprehensive, his treatment of *C. Storckii* Seem. as a variety of Baillon's species having been rejected long ago by most botanists concerned with this complex. I find no reason to maintain under *C. Verreauxii* the plant typified by *Ramos* 22356, because this plant differs from the true *C. Verreauxii* far more than does *C. Storckii*, the foliage and pubescence of *C. rectipilus* being wholly unlike those of the Australian *C. Verreauxii* var. *genuinus*. A poor specimen that may belong to *C. rectipilus* is Merrill 11547, 1922, from the Island of Golo, originally distributed as *C. leiophyllus*. This specimen should also be compared with *C. luzoniensis* Muell. Arg. var. *bataanensis* Croiz., described elsewhere in this paper.

***Croton pampangensis* sp. nov.**

Frutex videtur vel arbuscula, innovationibus primum dissite stellatomentosis, citissime glabris. Foliis tenuibus, lanceolatis vel elliptico-lanceolatis, basi arctius cuneatis, 5–10 cm. longis, 1–3 cm. latis, in sicco brunneo-olivaceis, tenellis trichomatibus stellatis parvis perpauca adpersis, adultis glaberrimis, margine crenato-denticulatis, dentibus callosis ad 3 per 1 cm. longitudinis, nervis primariis ca. 8–11-jugis delicatis, adscendentibus, petiolo 1–3 cm. longo gracili, apice glandulis 2 stipitatis insignito. Inflorescentia spicata, 2-sexuali. Floribus ♂: perianthio ca. 2 mm. magno, pedicello gracili ad 1.5–2 mm. longo, lobis petalisque subaequilongis, staminibus ca. 10, toro vix lanuloso. Floribus ♀: perianthio pedicello vix 1 mm. longo fulto, ca. 2 mm. longo, 3–4 mm. lato, lobis imbricatis, plus minusve evolutis, glanduloso-punctatis, apice callosulis, integris, ovario 1.5 mm. longo, 1 mm. lato, stylis brevibus, ut videtur ad basim imam partitis.

PHILIPPINE ISLANDS: Luzon: Province of Pampanga, Apalit, *Ramos* 41649, 1923 (TYPE); distributed as *C. leiophyllum* Muell. Arg.

The resemblance between this new species and *C. phuquocensis* Croiz., from the island of Phu-quoc, at the southern tip of French Indo-China, is striking, only the glands at the upper end of the petiole serving to distinguish one from the other at sight. The floral characters are likewise altogether close in the two entities.

Croton pampangensis differs from *C. leiophyllus* Muell. Arg. in the very short-pedicelled to sessile ♀ flower and in the details of the perianth. The nature of its pubescence and the serration separate it at sight from *C. rectipilus*.

***Croton leytenensis* sp. nov.**

Frutex vel arbuscula ignotae magnitudinis. Innovationibus primum trichomatibus stellatis multiradiatis valde adpressis, dissitis, argenteis vel rubiginosis indutis, citius glabris vel glabris. Foliis ellipticis apice late acuminatis basi cuneatis, 5–11 cm. longis, 1.5–5 cm. latis, margine repandulis vel subintegris, in sicco viridibus vel discolori-olivaceis, supra glabris, subtus glabris, nervis primariis 5–7-jugis late patentibus, delicatis; petiolo

tomentello-lepidoto vel glabrato, 0.5–1.5 cm. longo, glandulis 2 patelliformibus subsessilibus anticis insignito. Inflorescentia subspicata. Floribus ♂ : perianthio 5 mm. lato, pedicello ca. 3 mm. longo, lobis late triangularibus vel ovatis, 2 mm. longis, 1.5 mm. latis, petalis brunneis ligulatis, 2 mm. longis, 1 mm. latis, staminibus ca. 11, toro vix lanuloso. Floribus ♀ : perianthio subfoliaceo ca. 5 mm. lato, 2 mm. longo, lobis triangularibus saltem marginibus virescentibus, 1.5 mm. longis, 1 mm. latis, quove ad basim glandula sat magna aucto, petalis nullis, ovario globuloso, 2 mm. magno, indumento sat grosso rubiginoso e trichomatibus sublepidotostellatis, stylis 3 e basi liberis, quove primum 1.5 mm. integro, dein 1.5 mm. partito, semine ca. 6 mm. longo et, 5 mm. lato, columella ca. 6 mm. longa, coccis fructus delapsi ca. 1 cm. longis, pericarpio hic inde indumento subevanido vestito.

PHILIPPINE ISLANDS: Leyte: Palo, *Elmer* 7133, 1906 (TYPE); distributed as *C. leiophyllus* Muell. Arg.

A very distinct species, not at all like *C. leiophyllus*, with obscure affinities, suggesting *C. biarocnsis* Croiz. in the ♀ flower if not in the foliage. A sterile specimen, *Fénix* 28194, 1917, from Luzon, Apayao Subprovince, has a foliage that is reminiscent of that of *C. leytenensis*, and despite the different range might ultimately be found to belong here.

Croton lancilimbus Merr. in Phil. Jour. Sci. **20**: 395. 1922, Enum. Phil. Fl. Pl. **2**: 426. 1923.

This outstanding species appears to be narrowly localized in the island of Basilan and in the adjacent Zamboanga District of the island of Mindanao (the type-locality). Its resemblance to *C. pontis* Croiz., from Tonkin, Indo-China, is striking, a connection between the *Croton* of the Philippine Islands and Indo-China being evident in this and four other species, *C. babuyanensis*, *C. Quisumbingianus*, *C. pampangensis*, and *C. batangasensis*.

Thanks to the friendly interest of Dr. Quisumbing, I have seen the holotype, *Ramos & Edaño* 36855. This collection is an excellent match for *Hutchinson* 3992, 1906, Basilan, which was distributed under the mis-determination *C. Verreauxii* var. *angustifolia*. Recent accessions which belong to this species are *Liborio Ela Ebal* 912 and 929, 1941, both from the island of Basilan. The former is an absolute match of the holotype, and is reported by the collector to be a shrub along a creek, known in the Yakan language as "Nagus"; the latter bears at least one leaf fully 17 cm. long and 4 cm. wide, that is, larger than usual for the specimens I have so far seen. This collection (929) is described as a tree 5 m. high and about 5 cm. in diameter at the main stem, named in Yakan "Kalalayo." It is apparent that one and the same species is involved, despite the discrepancies in habit, size and vernacular names reported by the collector.

Croton consanguineus Muell. Arg. in Linnaea **34**: 101. 1865, in DC. Prodr. **15**[2]: 619. 1866; Merr. in Phil. Jour. Sci., Suppl. **1**: 78. 1906, Enum. Phil. Fl. Pl. **2**: 426. 1923.

Fragments of *Cuming* 1871, an isotype, collected at an unreported locality (see Merrill in Phil. Jour. Sci. **30**: 175. 1926), which is probably Leyte or South Luzon, are in our herbarium. These fragments are an excellent

match for the following collections, all distributed as *C. consanguineus*: Wenzel 1291, 1435, 1759, from Leyte; Elmer 15437, 15631, 17266, from Luzon, Province of Sorsogon, Irosin (Mt. Bulusan). In all these plants the indumentum is substantially the same; it consists of small grayish stellate trichomes, which even in the youngest leaves allow the glabrous under surface of the blade to show under the naked eye or the very weakest magnification. Adult leaves are scurfy-pitted underneath in a characteristic manner.

***Croton consanguineus* Muell. Arg. var. *molliusculus* var. nov.**

A planta typica quae indumento sat laxo subargillaceo gaudet (var. **genuinus** var. nov.), optime discedit indumento foliorum tomentello conferto molli, pedicello sub fructu paulo brevior, i.e. ca. 2 mm. (neque 3–6 mm.) longo.

PHILIPPINE ISLANDS: Luzon: Province of Cagayan, vicinity of Peñablanca, Adduru 28, 1917 (TYPE).

The material now available is insufficient to decide whether this peculiar plant, distributed as *C. luzoniensis* deserves a rank higher than varietal. The indumentum suggests *C. luzoniensis*, but the ♀ flower has the characters of that of *C. consanguineus*, differing only in the slightly shorter pedicel when in fruit. I do not believe that *C. luzoniensis* and *C. consanguineus* should be treated as one species, because their typic forms are clearly different. To bring these two entities together, a concept of species ought to be accepted which would automatically reduce *C. leiophyllus* Muell. Arg. to *C. laevifolius* Bl. and make impossible a critical classification of fully three-quarters of the forms of *Croton* endemic to eastern tropical Asia.

***Croton luzoniensis* Muell. Arg. in Linnæa 34: 118. 1865. in DC. Prodr. 15[2]: 624. 1866; Merr., Enum. Phil. Fl. Pl. 2: 427. 1923.**

An isotype, Cuming 1136, collected at Ilocos Sur, in Luzon, is represented in our herbarium by an excellent fragment. Very close to this plant, if not identical, are: Ramos 43078 and 43277, both from Bohol, and probably Loher 13288, Luzon, Province of Rizal, Montalban, represented in our collections only by a very poor specimen. These three sheets were mis-determined at distribution as *C. consanguineus*.

The indumentum of the typic form of *C. luzoniensis* is distinctly different from that of *C. consanguineus*. It consists of softish stellate hairs of light brown to orange color, thickly covering the innovations and both faces of the young leaf and in part persisting on mature leaves.

***Croton luzoniensis* Muell. Arg. var. *bataanensis* var. nov.**

A planta typica, quae foliis tenellis supra subtus molliter indutis statim dignoscitur (var. **genuinus** var. nov.), discedit foliis vix evolutis supra glaberrimis.

PHILIPPINE ISLANDS: Luzon: Province of Bataan, Foxworthy 10850, 1909 (TYPE).

The material has no ♀ flowers and cannot be placed with certainty on this account. It was originally distributed as *C. leiophyllus* Muell. Arg.,

which is apparently an error, as no forms of this species known to me have the softish stellate indumentum of *Foxworthy 10850*. This pubescence distinctly suggests *C. luzoniensis*, but Mueller's species has young leaves tomentose on both faces, not only underneath, which is an important differential character in *Croton*. So far as I can judge from the scanty material now available, *C. rectipilus* Croiz. is not this plant, because its pubescence is distinctly stellate-setulose, its young leaves being ciliate at the margins. More ample collections may show that a new species is involved here, rather than the variety of a known entity.

Croton palawanensis Merr. in sched. sp. nov. ' .

"*Croton* n. sp. in ms.," Elm. in Leaf. Phil. Bot. 4: 1281. 1911.

Croton heterocarpus sensu Merr. Enum. Phil. Fl. Pl. 2: 426. 1923; non Muell. Arg.

Arbuscula vel frutex lobis perianthii ♀ laxioribus exceptis, quoad visis, totus in floralibus cum *C. leiophyllo* Muell. Arg. optime congruens, sed foliorum notis insignis, primo intuitu pro specie propria pleno jure salutandus. Foliis ellipticis vel oblanceolato-ellipticis, 5–13 cm. longis, 2–6 cm. latis, pallide brunneis vel saepius olivaceis, evidenter coriaceis, margine revolutis obiterque crenato-serratis crenis ca. 2–3 per cm. longitudinis, venis adscendentibus ca. 8–jugis, gracilibus; petiolo 0.5–3 cm. longo, glandulis patelliformibus sessilibus cum folii epidermide confluentibus 2 posticis, in folio ipso imo neque in petiolo summo impositis.

PHILIPPINE ISLANDS: Palawan: *Foxworthy 857*, 1906; Puerto Princesa, Mt. Pulgar, *Elmer 12788*, 1911 (TYPE); vicinity of Puerto Princesa, Mt. Tapul, *Liborio Elabalo*, 1940; Tagdaraga, *Alcacid 5961*, 1938.

Croton heterocarpus Muell. Arg. (*C. ardisioides* Hook. f.) appears to reach its easternmost limits of distribution at Banguay Island in British North Borneo (*Castro & Melegrito 1439*), the form there found being identical to the endemic of Malaya (*Griffith 4783*; *Corner 22233*). It bears to *C. palawanensis* a superficial resemblance in the crenate-serrate margin of the leaf, but altogether differs from it in the minute very short-pedicelled to sessile ♀ flowers and all the floral ♀ characters in general. *Croton leiophyllus* Muell. Arg., discussed next, has floral ♀ parts which cannot be distinguished from those of *C. palawanensis* on the material available here, although the lobes of the ♀ perianth are apparently more evolute, inclosing the ovary rather deeply. A character which immediately identifies *C. palawanensis*, not to mention the unique manifestly coriaceous leaf, is the position of the glands; these are set on the lower face of the blade, not at the extremity of the petiole but on the midrib itself, being confluent with the epidermis of the blade. The biotype which this species represents can promptly be identified and appears to be constant in collections made at the same general locality. Since all the species of *Croton* in this group, and of the genus in general, are classified mostly by sums of floral and vegetative characters and intangibles, I see no reason to withhold specific recognition to this plant on the ground that I am not able at this hour to identify it by floral characters. It should be noted that in the vicinity of Puerto Princesa, Palawan, is also found *C. leiophyllus* Muell. Arg., which has altogether different glands and chartaceous rather than coriaceous leaves.

Croton leiophyllus Muell. Arg. in *Linnaea* **34**: 103. 1865, in DC. *Prodr.* **15**[2]: 573. 1866; Merr. *Enum. Phil. Fl. Pl.* **2**: 426. 1923.

This species is typified by two Cuming collections, 998 and 1075, duplicates of which I have seen in the herbarium of the Paris Museum, fragments having been taken for our collections with the kind permission of Prof. H. Humbert. According to Merrill (in *Phil. Jour. Sci.* **30**: 175. 1926), *Cuming* 998 and 1075 were collected in Luzon, the former in the Province of Pangasinan, the latter probably in that of Zambales. *Cuming* 998, which, as seen, has a slightly larger ♀ flower, is fully matched by *Holman* 14, 1910, Luzon, Province of Laguna, Payete, while *Cuming* 1075, the ♀ flower of which is minute, is most close to *Cenabre* 29167, 1923, Palawan, Puerto Princesa. Differences in the size of the ♀ flower in this species do not seem to correspond to local forms and may represent either vegetative or fixed morphological states which will require careful study. A plant from Basilan, *Tecson* 24049 (erroneously distributed as *C. consanguineus*), has the small flower of *Cenabre* 29167, from Palawan, while *Fénix* 15657, from the island of Balabac, which lies between Palawan and Borneo, cannot be distinguished from the plant of Luzon with robust ♀ flowers represented by *Holman* 14. The slender-pedicelled ♀ flowers of *Cenabre* 29167 are suggestive of those of *Barros* 24079, Luzon, Province of Isabela, which is an isotype of *C. leiophyllus* var. *multiflorus* Merr., *Enum. Phil. Fl. Pl.* **2**: 426. 1923, but are shorter, forming only a transition to the characteristic form of flower of the variety, not as yet falling within its limits. Nothing can be done to study these plants critically with material that, like the specimen available here, has neither ripe capsules nor seeds.

CLAOXYLON A. de Jussieu

Claoxylon subsessiliflorum sp. nov.

Arbuscula ad 3–4 m. alta, innovationibus subherbaceis parcissime setulosis vel glabris. Foliis ellipticis, utrinque acuminatis, 10–15 cm. longis, 2–4 cm. latis, submembranaceis atro-olivaceis subdiscoloribus, sub lente tenuiter papilloso glabratis glabrisve, margine obiter repando-serratis, nervis adscendentibus ca. 5–7-jugis gracillimis, alternis, glandulis anticis ad petioli basim valde obscuris vel nullis; petiolo flexuoso, herbaceo, 2–7 cm. longo. Floribus ♂ ignotis. Floribus ♀: cymula laterali (videtur), pauciflora setuloso-puberula ad 2–3 cm. longa, perianthio subsessili vel brevissime pedicellato, setuloso-puberulo, lobis ca. 4, fere ad basim liberis margine integris rotundatis, vix 1 mm. longis totidemque latis, petalis cum lobis (videtur) alternantibus, late quadrangulis, in sicco brunneis, ca. 1.25 mm. latis et 0.75 mm. longis, ovario ovoideo ca. 1.25 mm. magno, setuloso-puberulo, petala evidenter excedente, stylis 3 brevissimis papilloso.

INDO-CHINA: Tonkin: Province of Sontay, Mt. Bavi, *Pételot* 2638, 1940 (TYPE); "Arbuste de 3 à 4 mètres en forêt claire."

The characters of the ♀ flower easily separate this new species from all others so far known in the region. Like *Croton*, *Claoxylon* speciates mainly by alterations of the organs of the ♀ perianth, the foliage remaining constant to fairly constant within the same affinity.

OSTODES Blume

Ostodes Katharinae Pax in Pflanzenr. 47[iv. 147. iii]: 19. 1911.

Known so far only from the type-locality in Yunnan. A new record for Indo-China is represented by *Pételot 6548* and *6567*, both collected in Tonkin, Province of Sontay, Mt. Bavi, in light forest at an approximate altitude of 700 m., in May and June 1940 respectively. The large hairy capsule of this species is altogether characteristic.

CHEILOSA Blume

Cheilosa Whiteana sp. nov.

Arbor videtur. Foliis ovatis vel rotundato-ellipticis, brevissime acuminatis, basi cuneato-rotundatis vel cuneatis, 9–12 cm. longis, 6–8 cm. latis, firme chartaceis supra olivaceis subtus ochraceo-brunneis, tenellis adpresse ochraceo-strigulosus, adultis pilis perpaucis in nervorum axillis exceptis glaberrimis, margine valde obiter distanterque repandulo-crenatis, crenis glandulosis, glandulis cicatricosis sessilibus, venis penninerviis curvato-adscendentibus ca. 7-jugis, trabeculis gracilibus, glandulis ad petioli radicem anticis 2 sessilibus obscuris; petiolo canaliculato rigidulo 2–4 cm. longo. Inflorescentiis ♂ ignotis. Inflorescentiis ♀ lateralibus subterminalibusque habitu subspicatis, ut visis ad 5 cm. longis, totis adpresse pallide ochraceo-setulosus, flore squamula triangulari minuta axillato, quove (an abortu tanto?) singulo, pedicello setuloso ca. 1 cm. longo, perianthio ca. 7 mm. lato, lobis 5 discretis ad 3 mm. longis, 1.5 mm. latis integris, extus setulosus, disco sub ovario continuo vel subcontinuo, 0.5 mm. lato, hic inde pilis adpressis obsito, ovario globuloso-ovoideo toto ochraceo-hispido, ca. 3 mm. magno, stylis 3 vix 1.5 mm. longis apice vix in stigmatibus partitis, semine valde immaturo ca. 1 mm. magno.

PHILIPPINE ISLANDS: Luzon: Province of Pampanga, Mt. Arayat, *Curran 17733*, 1910 (TYPE).

As now constituted, *Cheilosa* includes but two species, *C. montana* Bl., of Java, and *C. homaliifolia* Merr., of Leyte. This new species abundantly differs from both. It differs from *C. homaliifolia* in the perianth, styles, and the leaf, which even when young is glabrous in Merrill's species, while it is manifestly setulose in mine. *Cheilosa montana* has an altogether different kind of foliage. The specific name is for Mr. Alain White, senior author of "The Succulent Euphorbieae" to whom I am indebted for the communication of numerous specimens of that tribe.

SAPIUM P. Browne

Sapium plumerioides sp. nov.

Arbor vel arbuscula tota glaberrima. Ramulis ultimis subcarnosulis, cicatricosis, cortice levi rubro-brunneo fere elenticellato. Foliis conferte verticillatis suberectis, ad 10 cm. longis et 4 cm. latis, oblongo-spathulatis ad (vulgo) spathulatis, epidermide coriacea, mesophyllo succulentiore inde nervulis in sicco perspicue minuteque reticulatis, nervis primariis ad 15-jugis gracillimis late patentibus, costa carnosula ad apicem potius recurva quam revera mucronata, lamina a quinto supero in petiolum carnosum abeunte, margine crenulato-serrata glandulosa, hic inde hydatodiis (glandulis crateriformibus) more proprio insignita. Inflorescentiis 2-sexualibus

ad 7 cm. longis, sat crassis, rigidis, spicatis. Floribus ♂ ca. 12, in axilla bracteolae triangularis ad 1.5 mm. latae subintegrae aggregatis, glandulis 2 magnis, perianthio proprio minuscule integro vel subintegro, staminibus ca. 2. Floribus ♀ ignotis: fructu brevissime pedicellato eximie capsulari, ad 0.5 cm. longo latoque, bene trigono, coccis rotundatis.

PHILIPPINE ISLANDS: Babuyan Group: Dalupiri Island, Bartlett 15167, 1935 (TYPE).

The type was distributed originally as *Excoecaria* on the strength of its resemblance to material of *E. Kawakamii* Hayata, from Formosa, and I have myself been misled at first to accept it under that genus. However, the disposition of the ♂ flowers, about 12 of which are crowded in the axil of a single bracteole, is definitely the one characteristic of *Sapium*.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1942

It was not anticipated that contributions to the Arnold Arboretum would be as extensive as in previous years, but the total of \$9461.25 is rather impressive when one considers existing economic conditions and the strains brought about by the present war. The receipts for the Gifts for Cultural Purposes Fund amounted to \$3061.25, in spite of the fact that no appeal for assistance was issued during the year. A bibliographic fund amounting to \$2500.00 was received from twenty-three supporters of the Arboretum which enabled us to provide for Dr. Verdoorn's immediate needs. The special travel fund was increased by anonymous gifts amounting to \$535.00, while from the same anonymous donor \$600.00 was received for the George B. Emerson Fellowship III. A grant of \$1200.00 was received from the Committee for Inter-American Artistic and Intellectual Relations to provide for the salary of Dr. Lorenzo R. Parodi during the time he was in the United States. During the year the first awards of the James R. Jewett and the Vieno T. Johnson prizes were made in accordance with the terms of gifts appertaining to the James R. Jewett fund. Also in accordance with the terms of gift the usual amounts were added to principal of the James Arnold and the Charles Sprague Sargent funds. Through the interest of Mr. and Mrs. Arthur G. Rotch of Boston, the Arboretum has received, on loan, an excellent oil painting of James Arnold and family, done in Italy about 1850, and this now graces the main reading room of our library.

The badly overcrowded condition of the herbarium and the overcrowding of certain sections of the library, mentioned in the last annual report, becomes more acute, but under existing conditions it is realized that we shall have to do the best that we can. A certain amount of important material can still be filed in the present herbarium, but any future large distribution is impossible until more floor space and additional steel cabinets can be provided.

Staff. — Through special funds provided for the purpose by numerous friends and supporters of the institution, it was possible to appoint as Bibliographer Dr. Frans Verdoorn, who has initiated work on a large and important project briefly discussed below under bibliography. Dr. F. P. Metcalf was appointed Research Associate for a period of one year to work with me on our accumulated collections from southeastern China. Dr. Lorenzo Parodi of the University of Buenos Aires was appointed Research Associate during the period he was in the United States under the auspices of the Committee for Inter-American Artistic and Intellectual Relations, November 19, 1941 to March 18, 1942. Dr. Charlotte G. Nast was appointed Curator of Wood Collections, and Dr. Hui-Lin Li Technical Assistant. Professor Alfred Rehder and Dr. J. H. Faull, both retired, con-

tinue to work daily on the problems in which they have so long been interested. It is fortunate that our policy is such that a continuation of important research is possible in special cases when retirement, because of the age limit rule, becomes effective. For the first time the Arboretum was assigned the services of four student assistants under the auspices of the National Youth Administration, through whom much important routine work was accomplished.

Instruction. — Various staff members have cooperated with the Division of Biology, through which the Arboretum is affiliated with Harvard University, in offering undergraduate and graduate courses and in supervising graduate students specializing in botany. During the year Dr. Raup gave a course on methods and problems in the study of vegetation, and has outlined a new course that was offered in the summer of 1942 on elementary field botany. Dr. Sax gave a course on cytogenetics, and in association with Dr. Mangelsdorf and Dr. Reed another one on advanced genetics. Dr. Bailey gave an advanced course on the comparative morphology and development of the vascular plants. Under our agreement with the Division of Biology, our staff members may offer a single half-unit course every other year.

The work of the following graduate students was supervised by the staff members indicated: Richard A. Howard by Dr. Johnston; E. Chalmers Smith and George Skirm by Dr. Sax; J. H. Soper and John Brainard by Dr. Raup; Charles Heintzelman and Clyde F. Reed by Dr. Bailey; and Hui-Lin Li and Luetta Chen by myself.

Buildings and grounds. — No changes have been made during the year as far as buildings are concerned; they have been maintained as usual. In the grounds one important change has been made for which we are indebted to Mr. William P. Long, Chairman of the Park Commission. He had excellent, well-designed, new signs prepared and installed at the most used entrance gates to replace the old ones; an important innovation was added, in that the name of each gate is indicated for the benefit of the visiting public. Thus the new gate signs are now coordinated with the direction signs established here and there within the Arboretum. Approximately 2200 new display labels were prepared and of these 800 were placed on the plants, the remainder being reserved for future use.

Now that the detailed planting maps are finished and the identifications of the growing plants checked, much attention has been given to the elimination of unnecessary duplicates as well as certain unsightly species of trees and shrubs that were represented elsewhere in the grounds by good specimens. Special attention was given to the arborvitae and *Chamaecyparis* collection, where 18 plants were removed, and to the general conifer collection, where fifty plants were eliminated, adding much to the attractiveness of this outstanding collection, for many of these had been irreparably damaged by the great hurricane of 1938. Over 100 plants were taken

out of the badly overcrowded Centre Street beds and about 40 from the Bussey Hill plantings. Following the actual checking of named specimens in the already very large collection, some 6500 different species and varieties being involved, new labels with corrected names are being installed as rapidly as possible. The work is very critical and progress is naturally slow. About 350 changes were made during the spring flowering season.

The Hemlock Hill area, badly devastated by the hurricane of 1938, suffered still further in that some sixty old trees left standing after the hurricane died during the early part of 1941. Their death was due to a variety of causes, including great damage to their root systems and twisting of their trunks by the storm, and perhaps to a certain degree by the undue drying out of the terrain following the destruction of the majority of the trees on this once densely forested area. With the assistance of the woods crew of the Harvard Forest, about sixty of these old, dead or moribund trees were felled, and the trunks and branches removed without injury to the now thrifty, well-established young hemlocks that were planted there in 1938-39 and 1939-40 to replace the lost stand of large trees. It is in this one place that the disastrous effects of the great hurricane will be evident for many years to come.

The Centre Street tract presented to the Arboretum by Mr. John S. Ames last year has been placed in a reasonably presentable condition. Unwanted native plants have been eliminated, and many vines and about twenty hybrid crab apples planted. It will take some years to bring this old quarry site into good condition, as, because of the physical condition of the soil and the preponderance of broken rocks, rapid tree growth can scarcely be expected. On the Bussey mansion site a number of hybrid crab apples have been planted, but eventually this area will be worked out as the terminus of the now very large and steadily expanding lilac collection.

Horticulture. — The past winter was mild and as a result there was very little winter killing of flower buds, the net result being one of the most floriferous displays in April and May in the recent history of the Arboretum. During the spring of 1942 one hundred thirty-eight new additions were made to the growing collections by transfer from the nursery. We have at present approximately 2500 different items in the nursery, most of which will be added to the living collections when the plants are large enough to transfer to their permanent places in the grounds.

Because of the great popularity of the lilac collection and the very large number of species and varieties already established, it was decided to make a serious attempt to obtain all the varieties now being grown in America. During the year we acquired 61 additional varieties, bringing our total number of lilac species and varieties to 556. In connection with this project we have cooperated with a group of individuals representing certain botanical gardens and arboreta in a critical examination of the named varieties, which has resulted in the publication of a complete list, with the histories and relative merits of each recognized variety. Now that this lilac study is

completed a similar project has been undertaken on the ornamental crab apples, and a major part of this work will be done at the Arboretum, because of our very large living collections of these attractive plants.

There is naturally very great interest at present in plants of economic value. We have capitalized on this interest to the extent of acquiring thirty additional varieties of nut trees and seventeen varieties of blueberry shrubs. It was thought that it would be highly desirable to establish and maintain these for the benefit of the numerous individuals who seek information regarding them. There is another reason for building up our collection of select economic varieties. Not infrequently, in the past, important forms have been located "in the wild," and these and horticulturally derived varieties not infrequently become lost for one reason or another and drop out of sight. It is desirable that the specialists interested in such finds should realize that the Arnold Arboretum is an excellent place in which important variants may be grown permanently.

The total number of living plants received from various sources in the United States and Canada was 2307. In the same period we received 51 packets of seeds and 187 lots of scions. We distributed 2093 living plants, 257 packets of seeds, and 248 lots of scions. It has become increasingly evident that the Arboretum is financially and physically unable to fulfill all requests that it receives for propagating material representing rare plants. In the past, repeated requests have been received from individuals who obtain material, grow a few plants, dispose of them at high prices, and then make requests for additional propagating material the next year. To obviate certain difficulties inherent in this practice, we now actually propagate and establish extra stock of certain rare plants in our nurseries. This living material is offered to a selected list of cooperating nurserymen, well distributed throughout the United States, who have requested such material, and who agree not to dispose of the living plants that we supply to them, but to utilize these plants as a source of their own propagating material. In this we believe that we are rendering a real service to professional horticulturists, and at the same time we are protecting our own rare species while actually making important items commercially available.

Cytogenetic Laboratory. — The plant breeding work of the past several years has produced a number of promising hybrids. About ten percent of the apple and cherry trees in the experimental nurseries have flowered and among these several are superior ornamental types. Crosses between Oriental and American species of *Malus*, and between diverse species of *Prunus*, have been made possible by utilizing the embryo culture technique. A new type of lilac has been obtained from the progeny of *Syringa persica*. The hybrid *Rosa Harisonii* has produced a variable F_2 population, and several interesting segregates have been obtained. The segregates of *Berberis mentorensis*, a hybrid between the evergreen *B. Julianae* and *B. Thunbergii*, include some evergreen plants with intermediate leaf types. The cytological work has dealt with the effect of X-rays on chromosome

structure, and differential sensitivity of various parts of seeds and young plants. This work was aided by a grant from the International Cancer Research Foundation.

Wood Anatomy. — Professor Bailey and Dr. Nast have devoted considerable attention to the problems of determining the affinities of herbarium specimens that cannot be assigned with certainty to specific families by an examination of their external morphology. This type of work necessitates intensive investigations of the internal structure of all parts of an herbarium specimen, viz. stem, node, petiole, leaf, and floral organs if available. In addition, it is essential to have extensive collections of anatomical preparations in the form of slides for comparative purposes. Such slides are of course indispensable in any fundamental investigation of the phylogeny and relationships of the various families of the angiosperms.

Considerable progress has been made during the last year in expanding the collection of slides of dicotyledonous woods to include anatomical preparations from herbarium specimens. Special emphasis was placed upon developing a reference collection of pollen slides, since such a collection should ultimately be of much utility not only to taxonomists, paleobotanists and morphologists, but also to those concerned in the analysis of peat and other organic deposits and in the study of hay fever. Through the assistance of Dr. Clyde F. Reed and of various graduate students, between 3000 and 4000 permanent pollen mounts, representing approximately 1800 genera in 160 families of the angiosperms, were added to the slide collection. To the collection of microscopic slides of wood sections 382 were added, bringing the total to 24,764, representing 7183 species. The wood collection was also increased from 5278 to 5569 species, the totals in the collections now being 9426 individual collections (preserved specimens) and 12,402 individual collections (dried specimens).

Several cooperative investigations have been undertaken both within and without the University. Professor Bailey and Dr. Smith are attempting to correlate taxonomic and anatomical data in the study of the relationships of various families of the Ranales. Dr. Nast is cooperating with Messrs. Krukoff and Gilly of the New York Botanical Garden in an intensive study of the Sapotaceae. Professor Bailey and Dr. Barghoorn, working in collaboration with Mr. Frederick Johnson of the Peabody Foundation for Archaeology, prepared a report upon the stakes and wattles of the Boylston Street Fishweir. Professor Bailey has also cooperated with Dr. Earl E. Berkley of the United States Department of Agriculture in the interpretation of physical data obtained by X-raying coniferous and dicotyledonous woods.

Plant Pathology. — Official work in this field largely ceased with the retirement of Dr. Faull. To meet a critical situation in genetics, provision had to be made to take care of that problem, and we were unfortunately obliged to cancel a proposed appointment in plant pathology. Dr. Faull,

however, continues to occupy his laboratory and is prosecuting investigations in his special field. He courteously takes care of our special problems as they arise, even although he at times has to sacrifice his own personal interests.

The Herbarium. — During the year a total of 24,575 specimens was mounted, of which 23,101 were inserted into the herbarium, the remainder being herbaceous plants. In order to facilitate the keeping of records, it was decided to treat the mounted specimens which are under study or which, because of lack of space, cannot be inserted into the general collection at present as actually a part of the herbarium. In this category are 55,275 previously mounted specimens, largely Chinese and New Guinean plants still being studied by staff members. The addition of these plants to the herbarium total, together with specimens mounted and inserted this year, brings the total number of specimens in the herbarium to 592,256.

The number of specimens received by exchange, gift, subsidy, purchase, or for identification was 46,709. This number may be broken down geographically as follows: from North and South America, 25,212; from Papuasias, 7,359; from Polynesia, 6,860; from Indo-China, India, and Malaysia, 5,534; from Australia, 786; from the Philippines, China, Japan, and Africa, 958. The largest American collection received was a set of 5,432 specimens from the Universidad Nacional de Tucuman, Argentina; other important collections were about 6,000 specimens (including duplicates) collected in Fiji by Otto Degener (the concluding shipment of material obtained during the 1940–41 cruise of the "Cheng Ho," sponsored by Mrs. Anne Archbold), 6088 specimens received in exchange from the Botanic Garden at Buitenzorg, Java, 1271 specimens collected in New Guinea by M. S. Clemens, and 1629 specimens purchased from the Boston Museum of Natural History, this last item including important historical material from Java and India collected by Zollinger and Wight.

The Arnold Arboretum distributed to other institutions a total of 19,412 duplicates, practically all of which went to American institutions; 17,627 of these specimens were sent as exchange, the remainder for identification by specialists. To the Gray Herbarium 11,075 specimens and 222 illustrations were transferred, to the Farlow Herbarium 271 specimens, and to the Ames Orchid Herbarium at the Botanical Museum 973 specimens. Books and microfilm to the equivalent value of 8,355 specimens were distributed under a special exchange arrangement. Thus the total number of specimens or their equivalent sent out was 27,989. A great quantity of material has been set aside for shipment to European herbaria when possible.

Forty-one loans, with a total of 4,087 specimens, were sent out for study by specialists in 18 American institutions. For study by our own staff members, 106 loans consisting of 7,288 specimens were borrowed from 23 institutions.

The card catalogue of references to new species and other important literature in the field of the taxonomy of woody plants now totals 131,695

cards, having been increased by 2,576 cards during the year. The collection of negatives representing types and other critical specimens was increased by 91 and now contains 4,138 negatives.

Routine work in the herbarium has been greatly handicapped by the fact that expansion space is at an end; no further distribution of specimens into the herbarium, except for small and especially needed groups, will be possible until additional floor space and cases are available. As a makeshift arrangement newly mounted specimens are being filed in generic order in cardboard cases on top of the steel cases in the Conifer Room, thus making consultation of the new material in each family possible, although very inconvenient. Due to war conditions, incoming material has been substantially less than in recent years, and this has permitted the mounting of many older collections which had been set aside in favor of more recent and more urgently needed collections. However, a vast amount of unmounted material still awaits attention. During the year we have continued to incorporate clippings, typed descriptions, and illustrations into the herbarium, and the work of breaking down the large genera into geographic series has been essentially completed.

Staff members continued to work in their special fields, in addition to carrying out routine work of identification. Numerous papers were prepared for publication, as indicated by the bibliography appended to this report. Professor Rehder made substantial progress with the bibliographical supplement to his Manual of Cultivated Trees and Shrubs. Dr. Smith completed his study of the Fijian collection made by Otto Degener and prepared a report for publication, also continuing his work on certain Papuan families and undertaking, in collaboration with Professor Bailey, a study of the woody Ranales. Dr. Johnston has worked almost exclusively on the flora of the plateau region in northern Mexico, including a critical study of his own collections and those prepared by Mr. Robert Stewart. While his own and the Stewart collections were being mounted preparatory to study, he named and reported on three large collections from western Texas and northern Mexico. He has commenced work on his catalogue of the flora of Coahuila and eastern Chihuahua. His work has been greatly facilitated through the acquisition of important collections from contiguous areas. Dr. Raup has prosecuted some special field work in New England, but has devoted most of his time to a study of collections made by himself and others in northern Canada. He has reported on approximately 1000 numbers sent to him by correspondents for identification. Two new projects have been developed, one preparing detailed range maps showing the Canadian, Alaskan and northern United States distribution of the Mackenzie Mountains species; the other on trends in the development of geographic botany. Dr. Kobuski has prepared regional studies of certain genera of Theaceae in America and is continuing his studies of this family. Mr. Palmer, in addition to extending his collections of cultivated plants in the Arboretum, has given special attention to the genera *Quercus* and *Crataegus*. Dr. Allen has continued her work on the Lauraceae of eastern Asia, has

completed a study of this family in Papuasias, and is undertaking preliminary work on the American representatives. Dr. Perry has devoted most of her time to continued study of the extensive Papuasian material collected by the Archbold Expeditions, Mrs. Clemens, and other collectors. Dr. Croizat has extended his work on the Euphorbiaceae and has undertaken studies of certain groups in the Cactaceae. Dr. Li completed his monographic study of the Chinese Araliaceae and began identification work in selected families of the large Chinese collections received by the Arboretum in recent years. Miss Luetta Chen has completed her work on the genus *Sabia*. Dr. F. P. Metcalf of Lingnan University, who had spent the previous year at the Arboretum on the basis of a Guggenheim Foundation Fellowship, was appointed Research Associate for the year 1941-42, to work with me on the basis of a Milton Fund grant on our accumulated collections of Chinese material. He resigned to accept a commission in the Army Intelligence Service on April 15. My own work has been largely on various problems appertaining to the floras of China, Indo-China, the Philippines, New Guinea and the Solomon Islands, on Polynesian bibliographic problems, and towards the end of the year the initiation of a very extensive investigation of the botanical problems raised by the erratic work of Rafinesque between the years 1804 and 1840. This will involve a searching examination of all the numerous botanical papers that he published, many of them exceedingly rare, the preparation of a very extensive card index, and the eventual preparation of an Index Rafinesquianum in which it is proposed to list all of his thousands of new generic and specific names; a preliminary estimate seems to show that this will result in the probable addition in excess of 1200 entries to Index Kewensis. Because of the homonym rule it is highly desirable that all these legitimately published names be listed, for over 100 years has elapsed since they were published. This is one of the very few places in which such a task could be consummated, for fortunately the library of the Arnold Arboretum contains an almost complete set of Rafinesque's very numerous publications on botany.

Field work. — Because of war conditions, all of our cooperative field work has ceased in China, Siam, Burma, India, and Philippines, and Malaysia. We have been able to accomplish some important work in Cuba, operating through the Atkins Institution by employing a Cuban collector who had served two seasons as an assistant to Dr. Richard A. Howard. A similar attempt in Mexico was reasonably successful, but after a fair trial was discontinued. We were able to finance an assistant to Dr. Richard Schultes, Mr. C. Earle Smith, for several months' field work in Colombia, but critical shipping conditions have as yet not made the delivery of the Cuban or the Colombian collections possible; the material prepared is however in safe storage in Cienfuegos and Bogotá. A modest grant was made to the Instituto Miguel Lillo at Tucuman to finance an exploration of a little known area in northern Argentina. Dr. Johnston, partly financed by the Carnegie Institution, spent ten weeks beginning August 1, 1941

prosecuting field work in Coahuila and Chihuahua, Mexico, in the cooperative project between the Arboretum and the Carnegie Institution, involving an ecological and systematic survey of the Mexican desert floras. His season was particularly successful, as it was considered to be the wettest one in about twenty-five years. The vegetation naturally responded to the unusual precipitation, and what is even better, he was able to visit remote areas that in normal years are closed to travel because of the scarcity and uncertainty of the water supply. Regions previously unvisited by any botanist were explored. He collected about 2000 numbers represented by approximately 10,000 specimens. Dr. Johnston, on his previous trip to this region, interested Mr. Robert Stewart, a local resident, in botanical field work, and through modest grants made to him from Arboretum funds to cover the expenses of field work, we have acquired approximately 1800 numbers with ample duplicates from this same general region. Some local field work in New England was prosecuted by Dr. Raup and Mr. Palmer.

Bibliography. — Dr. Verdoorn has made excellent progress on his major project initiated at the beginning of the year. This is projected as an "Index Botanicorum" or a biographical dictionary of plant scientists. A standard printed form, to be filed for reference, has been prepared for each entry, and to these forms a great mass of data appertaining to individual botanists is being transferred from a variety of sources. The files at present contain about 20,000 names and it is believed that ultimately this may be increased to about 50,000. This task is projected to cover the subject for the entire world from the earliest times to the present. Supplementary to this project he is also compiling corresponding data on the history of botanical gardens. He has found the library of the Arnold Arboretum to be a unique source of published work needed for consultation in connection with researches on botanical history.

The Library. — During the past fiscal year accessions to the library amounted to 310 bound volumes, 226 pamphlets, 188 photographs and 105 negatives, and approximately 100 nursery catalogues. The total number of bound volumes is now 45,122, of pamphlets 13,183, and of photographs 18,850. Mrs. Susan Delano McKelvey made a generous gift of 156 photographs and 105 negatives. Some 1,720 cards were added to the main catalogue, 1,216 of them containing bibliographical data, and 427 slips were added to the subject catalogue which continues the printed subject catalogue of the library. Many books have been sent out on inter-library loan, most of them to other departments of the University, while numerous volumes have been borrowed for use here. The number of periodicals received by exchange and subscription was materially reduced because of mailing conditions. Requests for microfilms and photostats continued to be numerous. A list of duplicates has been widely distributed to libraries and universities in this country, and most of the important items have been sold.

Atkins Institution of the Arnold Arboretum, Soledad, Cienfuegos, Cuba. — This unit now operates under its own charter, having been registered with the local provincial authorities as a non-profit scientific institution at the beginning of the fiscal year. The net results have been satisfactory, as certain restrictions imposed through industrial and commercial laws are eliminated. In the garden itself the activities have been largely of a routine nature, but additional plantings have been made in the palm section and in the succulent garden, and the native woodland section has been further improved by eliminations of some of the more rapidly growing trees that overshadowed more desirable and slower growing hardwood species. Arrangements have been made to establish a variety nursery for Pará rubber selections (*Hevea brasiliensis*) in cooperation with the United States Department of Agriculture, the objective being to provide a place from which disease free bud-wood may be secured for plantation developments elsewhere in tropical America. The garden nursery has also been increased in size to take care of accessions awaiting transfer to their permanent sites. The construction of the extensions to the greenhouse and lath house, and the completion of the connecting shelter house for visitors, provided for through an anonymous gift in the preceding year, was consummated. Casual visitors have been fewer, but among those who registered at Harvard House and took advantage of the facilities there available were Mr. Fred H. Howard, interested in certain sugarcane problems, Dr. Falconer Smith, to study ants, Dr. D. Eugene Copeland, interested in frogs, Dr. Hugh C. Cutler in connection with a study of maize varieties of tropical America, Dr. Richard A. Howard for field work in botany, Dr. C. V. Morton for field work in botany, Major Chapman Grant, interested in lizards, Dr. A. S. Forster, on a Guggenheim Foundation Fellowship to study cycads, Dr. Marie Victorin and Brother Léon, in connection with their investigations of the Cuban flora. The summer rains were normal, but the autumn precipitation was light. The total rainfall for the year was 46.29 inches. The publication of the Frère Marie Victorin-Frère Léon "Itinéraires botaniques dans l'île de Cuba" by the University of Montreal in the early part of 1942 was made possible by generous donations through the Atkins Institution to the University of Montreal, from Mrs. Atkins and Dr. Barbour, an excellent illustration of inter-institutional and international cooperation. One hundred eighty packets of seed, 147 plants, and 113 cuttings were distributed, and 241 packets of seeds and 160 plants were received.

Publications. — The two regular serials, the technical Journal of the Arnold Arboretum and the popular *Arnoldia* (a continuation of the Bulletin of Popular Information), have been maintained at their usual standard of excellence. No special publications were issued during the year. Plans have been perfected to discontinue the Contributions from the Arnold Arboretum, the last number of which was issued in 1938, and to replace it by a somewhat more economical format under the title of *Sargentia*. This will be issued at irregular intervals and will provide a place for the publi-

cation of important technical papers by staff members that are too long for Journal articles. The name selected commemorates Dr. Charles Sprague Sargent, who organized the Arnold Arboretum and served as its director for the first fifty-five years of its existence. A bibliography of the published writings of staff members and of students working under the supervision of staff members follows.

Bibliography of the Published Writings of the Staff and Students July 1, 1941 — June 30, 1942

- ALLEN, C. K. Gentianaceae. In Woodson, R. E., Jr. & Schery, R. W. Contributions toward a flora of Panama, V. *Ann. Missouri Bot. Gard.* **28**: 459-460. 1941.
- Lauraceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39. *Brittonia* **4**: 56-63. 1941.
- Studies in the Lauraceae, IV. Preliminary study of the Papuanian species collected by the Archbold expeditions. *Jour. Arnold Arb.* **23**: 112-155. 1942.
- ASMOUS, V. C. Jubilee of the Society of Naturalists of Moscow. *Chron. Bot.* **6**: 422-423. 1941.
- P. S. Pallas, a great Russian naturalist, 1741-1811. *Rossiya* **9**(2210): 3. 1941 (In Russian).
- P. S. Pallas as a botanist and explorer, 1741-1811. *Chron. Bot.* **7**: 14. 1942.
- Russian discoveries in the Pacific Ocean. *Rossiya* **10**(2372): 3-4. 1942 (In Russian).
- BAILEY, I. W. & BARGHOORN, E. S., JR. Identification and physical condition of the stakes and wattles from the Fishweir. In Johnson, F. The Boylston Street Fishweir. Peabody Foundation for Archeology. Andover. 82-89, 4 *pl.* 1942.
- & BERKLEY, E. E. The significance of x-rays in studying the orientation of cellulose in the secondary wall of tracheids. *Am. Jour. Bot.* **29**: 231-241, 18 *fig.* 1942.
- & HOWARD, R. A. The comparative morphology of the Icacinaceae, III. Imperforate tracheary elements and xylem parenchyma. *Jour. Arnold Arb.* **22**: 432-442, 3 *pl.* 1941.
- & HOWARD, R. A. The comparative morphology of the Icacinaceae, IV. Rays of the secondary xylem. *Jour. Arnold Arb.* **22**: 556-568, 4 *pl.* 1941.
- CROIZAT, L. The "Cactaceae" of W. T. Marshall and T. B. Bock: a review. *Desert* **14**: 77-78. 1942.
- On certain Euphorbiaceae from the tropical Far East. *Jour. Arnold Arb.* **23**: 29-54. 1942.
- Confusion in Viburnums. *Am. Nurseryman* **74**(11): 5-7, 1 *fig.* 1941.
- Echinofossulocactus or Stenocactus. *Cactus & Succ. Jour.* **14**: 69-71, 1 *fig.* 1942.
- Euphorbiaceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39. *Brittonia* **4**: 96-98. 1941.
- Euphorbiaceae and Sapindaceae. In Moldenke, H. N. The flora of extra-tropical South America, II. *Lilloa* **6**: 298-304. 1941.
- Identifying maples in winter. *Am. Nurseryman* **75**(3): 5-6, 2 *fig.*, (4): 13-14, 6 *fig.* 1942.
- Identifying trees in winter. *Am. Nurseryman* **75**(6): 5-6, 2 *fig.* 1942.
- Kalanchoe Gossweileri sp. nov. from Portuguese Africa. *Desert* **14**: 25-27, 1 *fig.* 1942.
- Kleinia pendula, the inch-worm. *Desert* **13**: 185-188, 3 *fig.* 1941.
- Mammillaria Nellieae comb. nov. *Cactus & Succ. Jour.* **14**: 34. 1942.

- On methods and experiments. *Cactus & Succ. Jour.* **13**: 184–185. 1941.
- New and critical Euphorbiaceae chiefly from the southeastern United States. *Bull. Torrey Bot. Club* **69**: 445–460, 2 fig. 1942.
- New species of *Croton* from Guatemala. *Field Mus. Nat. Hist. Bot. Ser.* **22**: 445–453. 1942.
- Notes on the Euphorbiaceae, II. *Bull. Jard. Bot. Buitenzorg* **III**. **17**: 204–208. 1941.
- Peculiarities of the inflorescence in the Euphorbiaceae. *Bot. Gaz.* **103**: 771–779, 14 fig. 1942.
- *Phyllanthus nummulariaefolius* Poir. in the United States. *Torreya* **42**: 14–17. 1942.
- Preliminaries for the study of Argentine and Uruguayan species of *Croton*. *Darwiniana* **5**: 417–462. 1941.
- A study of *Manihot* in North America. *Jour. Arnold Arb.* **23**: 216–225, 1 fig. 1942.
- The succulent Euphorbiaceae, a review. *Desert* **13**: 193–194. 1941.
- The tribe Plukenetinae of the Euphorbiaceae in eastern tropical Asia. *Jour. Arnold Arb.* **22**: 417–431. 1941.
- HELMSCHE, C., JR. Comparative anatomy of the secondary xylem in the “Gruinales” and “Terebinthales” of Wettstein with reference to taxonomic groupings. *Lilloa* **8**: 83–198, 17 pl. 1942.
- JOHNSTON, I. M. Bibliographic data concerning Gay’s *Flora de Chile*. *Darwiniana* **5**: 154–165. 1941.
- Boraginaceae. In Kearney, T. H. & Peebles, R. H. Flowering plants and ferns of Arizona. Washington. 740–761. 1942.
- KOBUSKI, C. E. Theaceae and Oleaceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938–39. *Brittonia* **4**: 114–121, 165–168. 1941.
- Studies in the Theaceae, VII. The American species of the genus *Cleyera*. *Jour. Arnold Arb.* **22**: 395–416. 1941.
- Studies in the Theaceae, VIII. A synopsis of the genus *Freziera*. *Jour. Arnold Arb.* **22**: 457–496. 1941.
- Studies in the Theaceae, XI. *Killipiodendron*. *Jour. Arnold Arb.* **23**: 231–232. 1942.
- MANGELSDORF, P. C. The expanding literature on maize. *Jour. Hered.* **32**: 186. 1941.
- The origin of maize. *Proc. Eighth Amer. Sci. Congr.* **3**: 267–274. 1942.
- & ATKINS, I. M. The isolation of isogenic lines as a means of measuring the effects of awns and other characters in small grains. *Jour. Amer. Soc. Agron.* **34**: 667–668. 1942.
- MERRILL, E. D. Man’s influence on the vegetation of Polynesia, with special reference to introduced species. *Proceed. Sixth Pacific Sci. Cong.* **4**: 629–639. 1941.
- A new species of *Premna* from the Philippines. *Phytologia* **2**: 5–6. 1941.
- A note on the dates of issue of the fascicles comprising Cosson’s “*Illustrationes florae Atlanticae*,” 1882–1897. *Jour. Arnold Arb.* **22**: 455–456. 1941.
- Records of Indo-Chinese plants, III. *Jour. Arnold Arb.* **23**: 156–197. 1942.
- The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938–39. *Brittonia* **4**: 20–188, 3 fig. 1941.
- & METCALF, F. P. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance. *Jour. Arnold Arb.* **23**: 226–230, 1 pl. 1942.
- & PERRY, L. M. Myrtaceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938–39. *Brittonia* **4**: 125–127. 1941.
- & PERRY, L. M. Observations on the Old World species of *Turpinia* Ventenat. *Jour. Arnold Arb.* **22**: 543–555. 1941.

- & PERRY, L. M. *Plantae papuanae Archboldianae*. VII, VIII, IX. *Jour. Arnold Arb.* **22**: 375–388, 529–542. 1941; **23**: 233–265. 1942.
- & PERRY, L. M. A summary of *Kentrochrosia* Lauterbach and Schumann. *Philippine Jour. Sci.* **76**: 19–21. 1941.
- METCALF, F. P. *Flora of Fukien*. Fasc. 1. Lingnan University. i-xviii, 1–82, 2 maps. 1942.
- *Flowers of the Chinese New Year*. *Arnoldia* **2**: 1–8, 3 *pl.* 1942.
- Relationships between Chinese and Indian *Berchemia*. *Peking Nat. Hist. Bull.* **16**: 17–28, map. 1941.
- MURRILL, W. A. & PALMER, E. J. A new willow from Florida. *Jour. Arnold Arb.* **22**: 580–581, 1 *fig.* 1941.
- PALMER, E. J. *Panicum recognitum* in Rhode Island. *Rhodora* **44**: 227. 1942.
- The red oak complex in the United States. *Am. Midl. Nat.* **27**: 732–740, 2 maps. 1942.
- RAUP, H. M. Additions to a catalogue of the vascular plants of the Peace and Upper Liard River regions. *Jour. Arnold Arb.* **23**: 1–28. 1942.
- REHDER, A. New species, varieties and combinations from the collections of the Arnold Arboretum. *Jour. Arnold Arb.* **22**: 569–579. 1941.
- SAX, K. The behavior of x-ray induced chromosomal aberrations in *Allium* root tip cells. *Genetics* **26**: 418–425. 1941.
- The distribution of x-ray induced chromosomal aberrations. *Proceed. Nat. Acad. Sci.* **28**: 229–233. 1942.
- The mechanisms of x-ray effects on cells. *Jour. Gen. Physiol.* **25**: 533–537. 1942.
- Types and frequencies of chromosomal aberrations induced by x-rays. *Cold Spring Harbor Symp. Quant. Biol.* **9**: 93–101, 12 *fig.* 1941.
- SMITH, A. C. *Araliaceae* and *Vacciniaceae*. In Woodson, R. E., Jr. & Schery, R. W. *Contributions towards a flora of Panama*, V. *Ann. Missouri Bot. Gard.* **28**: 437–452. 1941.
- A new frailejone from Venezuela. *Bol. Soc. Venez. Cienc. Nat.* **7**: 237–238. 1942.
- Studies of Papuan plants, III, IV. *Jour. Arnold Arb.* **22**: 343–374, 497–528. 1941.
- The vegetation of the Guianas, a brief review. *Chron. Bot.* **6**: 449–452, 1 *fig.* 1941.
- & BAILEY, I. W. *Brassiantha*, a new genus of Hippocrateaceae from New Guinea. *Jour. Arnold Arb.* **22**: 389–394, 1 *pl.* 1941.
- SMITH, E. C. & NICHOLS, C., JR. Species hybrids in forest trees. *Jour. Arnold Arb.* **22**: 443–454. 1941.
- VERDOORN, F. Plant science institutions, stations, museums, gardens, societies, and commissions in Central and South America. *Chron. Bot.* **7**: 49–61. 1942.
- The future of our large institutions of systematic botany. *Chron. Bot.* **7**: 61–64. 1942.
- A list of plant scientists in Central and South America. *Chron. Bot.* **7**: 97–133. 1942.
- WERSHING, H. F. & BAILEY, I. W. Seedlings as experimental material in the study of "redwood" in conifers. *Jour. Forest.* **40**: 411–414. 1942.
- WYMAN, D. Elms grown in America. *Arnoldia* **1**: 65–80, 4 *pl.* 1941.
- The highbush blueberry. *Arnoldia* **2**: 29–32. 1942.
- Nursery sources for nut trees. *Arnoldia* **2**: 9–12. 1942.
- The one hundred "best" lilacs. *Arnoldia* **2**: 33–36. 1942.
- The order of bloom of trees and shrubs. In Wright, R. and others. *Gardening with the experts*. New York. pp. 189–212. 1941.

**Staff of the Arnold Arboretum,
1941-42**

ELMER DREW MERRILL, S.D., LL.D., Arnold Professor of Botany and Director.

JOHN GEORGE JACK, Assistant Professor of Dendrology, Emeritus.

ALFRED REHDER, A.M., Associate Professor of Dendrology and Curator of the Herbarium, Emeritus.

JOSEPH HORACE FAULL, Ph.D., Professor of Forest Pathology, Emeritus.

IRVING WIDMER BAILEY, S.D., Professor of Plant Anatomy.

KARL SAX, Ph.D., Professor of Cytology.

PAUL CHRISTOPH MANGELSDORF, S.D., Professor of Botany.

ALBERT CHARLES SMITH, Ph.D., Curator of the Herbarium.

IVAN MURRAY JOHNSTON, Ph.D., Associate Professor of Botany.

HUGH MILLER RAUP, Ph.D., Assistant Professor of Plant Ecology.

CLARENCE EMMEREN KOBUSKI, Ph.D., Assistant Curator of the Herbarium.

DONALD WYMAN, Ph.D., Horticulturist.

ERNEST JESSE PALMER, Collector and Research Assistant.

CAROLINE KATHRYN ALLEN, Ph.D., Assistant in the Herbarium.

LILY MAY PERRY, Ph.D., Technical Assistant. •

LEON CROIZAT, J.D., Technical Assistant.

FRANS VERDOORN, Ph.D., Bibliographer.

FRANKLIN POST METCALF, Ph.D., Research Associate.

LORENZO RAIMONDO PARODI, Ph.D., Research Associate.

CHARLOTTE GEORGIA NAST, Ph.D., Curator of Wood Collections.

HUI-LIN LI, Ph.D., Technical Assistant.

JANET RYTHER SELLARS, A.B., Librarian.

VLADIMIR CONSTANTIN ASMOS, A.B., Assistant Librarian.

SUSAN DELANO MCKELVEY, A.B., Research Assistant.

CONSTANCE MANSFIELD GILMAN, Business Secretary.

LOUIS VICTOR SCHMITT, Superintendent.

WILLIAM HENRY JUDD, Propagator.

INDEX

Synonyms are printed in *italics*; new names in **bold-face** type.

- Abies balsamea*, 8
Acacia aulacocarpa macrocarpa, 395
 — *crassicarpa*, 395
 — *leptocarpa*, 395
 — *Mangium*, 395
 — *pennata*, 396
Acer Negundo, 21
Achillea Ptarmica, 26
Achyranthes amaranthoides, 385
Acmena acuminatissima, 247
 — *hemilampra*, 248
 — *laevifolia*, 248
 — *polyantha*, 247
Actephila dolichantha, 30
 — *inopinata*, 29
 — *longipedicellata*, 29
 — *Merrilliana*, 29
Actinodaphne Archboldiana, 117
 — *Brassii*, 116
 — *solomonensis*, 117
 — *tomentosa*, 116
 Additions to a catalogue of the vascular
 plants of the Peace and Upper Liard
 River regions, 1
Adenanthra falcata, 395
 — *microsperma*, 396
Adenochlaena § *Symphyllia*, 53
 — *indica*, 53
 — *silhetiana*, 53
Aganosma grandiflora, 190
Agastache Foeniculum, 23
Agonis lysicephala, 87
Agrimonia striata, 20
Agropyron dasystachyum subvillosum, 10
 — *repens*, 10
 — — *subulatum*, 10
 — *riparium*, 10
 — *Smithii*, 10
 — *trachycaulum glaucum*, 10
 — — *novae-angliae*, 10
Agrostis scabra, 11
 — *stolonifera*, 11
Albizzia falcata, 395
 — *lebbekioides*, 395
 — *littoralis*, 394
 — *minahassae*, 393
 — *moluccana*, 395
 — *retusa*, 394
Alchornea androgyna, 47

 ALLEN, CAROLINE K. Studies in the Lau-
 raceae, IV. Preliminary study of the
 Papuan species collected by the
 Archbold Expeditions, 112
 — Studies in the Lauraceae, V. Some
 eastern Asiatic species of *Beilschmiedia*
 and related genera, 444
Alopecurus aequalis, 11
Alsomitra integrifoliola, 196
 — *tonkinensis*, 196
Amaranthus graecizans, 15
 — *retroflexus*, 15
Ambrosia artemisiifolia, 26
 — *trifida*, 26
Anantia stolonifera, 355
Anemone canadensis, 16
Anethum graveolens, 22
Antennaria aprica, 26
 — *atriceps*, 26
Anthemis Cotula, 26
 — *tinctoria*, 26
Apios carnea, 169
Apocynum alterniflorum, 191
Apodytes cambodiana, 66, 73
Arabis divaricarpa, 19
 — *hirsuta pycnocarpa*, 18
 — *Holboellii*, 18
 — — *retrofracta*, 18
 — *lyrata kamchatica*, 18
Aralia pseudo-ginseng, 187
Arceuthobium americanum, 14
Archboldianae, IX, X, *Plantae Papuanae*,
 233, 383
Archidendron gawadense, 392
 — *Ledermanii*, 392
 — *megaphyllum*, 392
 — *molle*, 393
 — *papuanum*, 392
 — *Schlechteri*, 391
Arctostaphylos Uva-ursi, 23
Ardisia albiflora, 345
 — *austroasiatica*, 347
 — *crassinervosa*, 348
 — *crispa angusta*, 348
 — *crispipila*, 345
 — *depressa*, 346
 — *elegans*, 349
 — *evonymifolia*, 353
 — *floribunda*, 347

- Ardisia gigantifolia*, 354
 — *Helferiana*, 345
 — — *septentrionalis*, 345
 — *humilis obovata*, 345
 — *kteniophylla*, 354
 — *kwangtungensis*, 349
 — *Merrillii*, 351
 — *micrantha*, 346
 — *oxyphylla cochinchinensis*, 345
 — *pedalis*, 351
 — *quinquegona*, 346
 — — *hainanensis*, 347
 — — *micranthera*, 346
 — — *oblonga*, 346
 — *solanacea*, 345
 — *stellifera*, 353
 — *Thorelii*, 349
 — *tonkinensis*, 353
 — **Tsangii**, 353
 — *villosoides*, 353
 — *virens*, 353
 — — *annamensis*, 353
 — *yunnanensis*, 348
 — *yunnanensis*, 347
Arenaria dawsonensis, 16
Aristolochia gracilifolia, 383
 — *megalophylla*, 384
 — *tagala*, 384
Armoracia lapathifolia, 18
Arnica obtusifolia acuta, 27
 Arnold Arboretum, 1941–42, Staff of the, 522
 Arnold Arboretum during the fiscal year ended June 30, 1942, The, 509
Artabotrys Petelotii, 162
Artemisia Abrotanum, 27
 — *Absinthium*, 27
 — *arctica*, 27
 — *biennis*, 27
 — *borealis*, 26
 — *caudata*, 26
 — *dracunculoides*, 26
 — *ludoviciana*, 27
Aruncus sylvester, 19
Arundarbor remotiflora, 101
Asarum glabrum, 160
 — *reticulatum*, 161
Asparagus officinalis, 13
Aster angustus, 25
 — *sibiricus*, 25
Astragalus canadensis, 20
 — *lineare*, 20
Atriplex hortensis, 15
 — *patula hastata*, 15
Avena Hookeri, 11
 — *sativa*, 11
Axyris amaranthoides, 15
Baeckea frutescens, 89
 BAILEY, I. W. & A. C. SMITH. Degen-
 eriaceae, a new family of flowering
 plants from Fiji, 356
Balanophora papuana, 383
Bambusa aurinuda, 95
 — *cerosissima*, 101
 — *gibba*, 101
 — *remotiflora*, 101
 — *Tsangii*, 97
Barbarea orthoceras, 18
Barclaya Motleyi, 390
Basisperma, 84
 — *lanceolata*, 84
Bauhinia bracteata, 170
 — *carcinophylla*, 171
 — *caterviflora*, 170
 — *Clemensiorum*, 171
 — *coccinea*, 170
 — *Harmandiana*, 170
 — *melanophylla*, 172
 — *monandra*, 399
 — *Schlechteri*, 399
 — *tenuiflora*, 170
 — *unguiculata*, 170
Beilschmiedia and related genera, Studies
 in the Lauraceae, V. Some eastern
 Asiatic species of, 444
Beilschmiedia Archboldiana, 130
 — *atrata*, 451
 — *Brassii*, 130
 — *brevipaniculata*, 446
 — *bullata*, 131
 — *Cairocan*, 445
 — *discolor*, 448
 — *erythrophloia*, 447
 — *Fordii*, 445
 — *grandiosa*, 449
 — *intermedia*, 448
 — *laevis*, 446
 — *longepetiolata*, 450
 — *macropoda*, 452
 — *obconica*, 453
 — *percoriacea*, 450
 — *pergamentacea*, 440
 — *robusta*, 447
 — *Roxburghiana*, 451
 — *spec.*, 445
 — *Tsangii*, 453
 — *Wangii*, 452
 — *yunnanensis*, 447
Bellium Burtianum, 439
 — *gracile*, 439
 — *haplopus*, 438
 — *Kajewskii*, 440
Betula papyrifera neoalaskana, 14

- Bibliography of the published writings of the staff and students July 1, 1941-June 30, 1942, 519
- Bladhia pseudoquinquegona*, 346
- Bonpland's "Description des plantes rares cultivées à Malmaison et à Navarre," 110
- Botrychium matricariaefolium*, 8
- *multifidum*, 8
- *ternatum rutaefolium*, 8
- Brassica arvensis*, 17
- *campestris*, 17
- *Kaber pinnatifida*, 17
- Brassiodendron*, 153
- *fragrans*, 153
- Braya purpurascens*, 18
- *Richardsonii*, 18
- Bromus inermis*, 9
- *Porteri*, 9
- *secalinus*, 9
- Bubbia amplexicaulis*, 438
- **Archboldiana**, 433
- *argentea*, 436
- *auriculata*, 438
- *bullata*, 426
- *calophylla*, 436
- *calothyrsa*, 427
- *Clemensiae*, 431
- *glauca*, 433
- *haplopus*, 438
- *idenburgensis*, 432
- *longifolia*, 429
- *megacarpa*, 434
- *monocarpa*, 428
- *montana*, 426
- *pachyantha*, 428
- *sororia*, 427
- *sylvestris*, 430
- Buxus pubifolia*, 174
- Calamagrostis canadensis*, 11
- — *robusta*, 11
- *neglecta*, 11
- Callicarpa heterotricha*, 192
- Callitriche hermaphroditica*, 21
- Calpogyne frutescens*, 49
- *hainanensis*, 51
- Calyptanthus rostrata*, 397
- Camellia pubicosta*, 183
- Camellina microcarpa*, 17
- *sativa*, 17
- Campanula aurita*, 25
- Canavalia papuana*, 406
- Cannabis sativa*, 14
- Capparis Petelotii*, 166
- *yunnanensis*, 167
- Caragana arborescens*, 20
- Cardamine oligosperma*, 18
- Cardaria Draba repens*, 17
- *pubescens elongata*, 17
- Carex aenea*, 12
- *angarae*, 12
- *atherodes*, 12
- *Garberi bifaria*, 12
- *interior*, 12
- *Kelloggii*, 12
- *lanuginosa*, 12
- *macloviana*, 12
- *misandra*, 12
- *montanensis*, 12
- *paupercula irrigua*, 12
- *retrorsa*, 13
- *scirpoidea*, 12
- *stenophylla enervis*, 12
- *stipata*, 12
- *sychnocephala*, 12
- *trichocarpa aristata*, 12
- Careya jambosoides*, 262
- Carum Carui*, 22
- Cassytha Archboldiana*, 155
- *filiformis*, 154
- — *pubescens*, 154
- — *subpubescens*, 154
- *tenuis*, 155
- Castilleja fulva*, 24
- *Henryi*, 24
- *Raupii typica*, 24
- Catalogue of the vascular plants of the Peace and Upper Liard River regions, Additions to a, 1
- Cephaelis siamica*, 195
- Cerastium Keysseri*, 387
- *papuanum geminiflorum*, 387
- — *phaenops eciliatum*, 387
- *vulgatum*, 16
- Ceratophyllum demersum*, 16
- *submersum*, 390
- Chamaerhodos Nuttallii*, 20
- Cheilosa Whiteana*, 507
- Chenopodium capitatum*, 15
- *glaucum*, 15
- *rubrum*, 15
- Chrysanthemum Leucanthemum pinnatifidum*, 26
- Cicca sinica*, 31
- Cicuta bulbifera*, 22
- *occidentalis*, 22
- Cinna latifolia*, 11
- Cinnamomum Archboldianum*, 113
- *Clemensii*, 113
- *solomonense*, 112
- Cirsium arvense*, 27
- *Drummondii*, 27
- *involutratum*, 197
- Citronella apogon*, 493

- Citronella paniculata*, 60
Claoxylon subsessiliflorum, 506
Cleistanthus concinnus, 41
 — *dubius*, 36
 — *Eberhardtii*, 39
 — *indochinensis*, 40
 — *longipedicellatus*, 29
 — *Petelotii*, 40
 — *Pierrei*, 39
 — *sageretioides*, 39
 — *tonkinensis*, 39
Cleome serrulata, 16
Cleyera integrifolia, 478
 — *serrulata*, 478
*Cnicus involucratu*s, 197
Coelodepas, 50
 — *hainanense*, 51
 — *spec.*, 49
Conringia orientalis, 17
Convolvulus cairicus, 192
Corallorrhiza Mertensiana, 13
 — *striata*, 13
Cornus controversa, 187
 — *oligophlebia*, 187
 — — *impressinervis*, 188
 — *stolonifera Baileyi*, 22
Couthovia leucocarpa, 412
 — *macrophylla*, 411
 — *novobritannica*, 410
Crataegus columbiana, 19
Crepis cineripappa, 197
 — *primulifolia*, 197
 — *tectorum*, 27
 — *virens*, 27
CROIZAT, LEON. A study of *Manihot* in North America, 216
 — New and critical Euphorbiaceae from the tropical Far East, 495
 — New species of *Croton* L. from New Guinea, 369
 — On certain Euphorbiaceae from the tropical Far East, 29
Croton L. from New Guinea, New species of, 369
Croton adumbratus, 495
 — *argyratus* 501
 — *argyratus*, 501
 — *avellaneus*, 498
 — *babuyanensis*, 499
 — *batangasensis*, 499
 — *biaroensis*, 496
 — *Brassii*, 369
 — *caryocarpus*, 44
 — *cascarilloides*, 46
 — *consanguineus*, 503
 — — *genuinus*, 504
 — — *molliusculus*, 504
Croton cotabatensis, 500
 — *Cumingii*, 46
 — — *angustifolius*, 46
 — *cupreus*, 501
 — *flocculosus*, 45
 — *hainanensis*, 46
 — *heterocarpus*, 505
 — *ignifex*, 43
 — *Kurzii*, 45
 — *kwangsiensis*, 42
 — *laevigatus*, 46
 — *lancilimbus*, 503
 — *Laui*, 46
 — *leiophyllus*, 506
 — *leytensis*, 502
 — *limitincola*, 45
 — *Luciae*, 370
 — *luzoniensis*, 504
 — — *bataanensis*, 504
 — — *genuinus*, 504
 — *mallotophyllus*, 372
 — *morobensis*, 369
 — *murex*, 41
 — *Novae-Astigis*, 499
 — *oreoborneicus*, 496
 — *palawanensis*, 505
 — *pampangensis*, 502
 — *philombros*, 371
 — *phuquocensis*, 44
 — *Pierrei*, 46
 — *pilargyros*, 372
 — *pontis*, 44
 — *potabilis*, 42
 — *punctatus*, 46
 — *pusilliflorus*, 374
 — *Quisumbingianus*, 500
 — *rectipilus*, 501
 — *scopuligenus*, 43
 — *semunculus*, 374
 — *tawaoensis*, 497
 — *Wassi-Kussae*, 375
 — *Ysabelae*, 375
Crudia subsimplicifolia, 399
Cryptocarya annamensis, 459
 — *Archboldiana*, 143
 — *argyrophylla*, 134
 — *aureobrunnea*, 142
 — *bernhardi*ensis, 144
 — *Brassii*, 137
 — *brevipes*, 139
 — *camptodroma*, 134
 — *chinensis*, 454
 — *Chingii*, 455
 — *concinna*, 454
 — *cordata*, 138
 — *densiflora*, 454
 — *exfoliata*, 135

- Cryptocarya globosa*, 137
 — *hainanensis*, 454
 — *Howi*, 458
 — *idenburgensis*, 136
 — *Kajewskii*, 144
 — *Lau*, 455
 — *Ledermannii*, 145
 — *Leiana*, 456
 — *lenticellata*, 457
 — *Maclurei*, 454
 — *Merrilliana*, 456
 — *Metcalfiana*, 457
 — *minutifolia*, 146
 — *obtusifolia*, 454
 — *palmerensis*, 140
 — *pergamantacea*, 141
 — *perlucida*, 145
 — *scalariformis*, 135
 — *subfalcata*, 142
 — *sulcata*, 140
 — *tetragona*, 133
 — *Tsangii*, 459
 — *umbonata*, 139
 — *Whiteana*, 143
Cryptocoryne longispatha, 156
Cudrania fruticosa, 157
Cynometra alternifolia, 399
 — *novo-guineensis*, 397
Cyrtotropis carnea, 169
Cytisus nigricans, 378
 — *triflorus*, 378
 — *villosus*, 378
Dalbergia Albertisii, 401
 — *densa australis*, 403
 — *novo-guineensis*, 402
 — *rivularis*, 402
Danthonia intermedia, 11
Daphnandra novoguineensis, 443
Decaspermum belense, 234
 — *Coriandri*, 234
 — *exiguum*, 235
 — *Forbesii*, 235
 — *humifusum*, 236
 — *neurophyllum leve*, 233
 — *nitentifolium*, 234
 — *nivale*, 236
 — *simile*, 236
Deeringia amaranthoides, 385
 — *baccata*, 385
 — *celosioides*, 385
Degeneria, 357
 — *vitiensis*, 357
Degeneriaceae, a new family of flowering plants from Fiji, 356
Degeneriaceae, 357
Dehaasia borneensis, 445
 — *Cairocan*, 445
DELISLE, ALBERT L. & KENNETH V. THIMANN. Notes on the rooting of some conifers from cuttings, 103
Dendrolobium triangulare, 170
Derris elegans, 403
 — *heptaphylla*, 403
 — *Koolgibberah*, 403
Descurainia Richardsonii, 18
 — *Sophia*, 18
Desmodium cephalotes, 170
 — *triangulare*, 170
Desmos monogynus, 163
DEUBER, CARL G. The vegetative propagation of eastern white pine and other five-needled pines, 198
Dicoelia Beccariana, 38
Dinochloa alata, 100
Diplophragma tetragulare, 193
Distichlis stricta, 10
Draba glabella, 16
 — *lanceolata*, 17
 — *luteola*, 16
 — *McCallae*, 17
 — *nemorosa lejocarpa*, 17
 — *nivalis*, 16
Dracaena terniflora, 157
Drimys amplexicaulis, 438
 — *arfakensis*, 423
 — *Brassii*, 421
 — *bullata*, 426
 — *buxifolia*, 419
 — *calothyrsa*, 427
 — *hatamensis*, 425
 — *macrantha*, 422
 — *microphylla*, 418
 — *obovata*, 424
 — *oligandra*, 420
 — *reticulata*, 423
 — *rubiginosa*, 420
 — *sororia*, 427
Dryadodaphne, 442
 — *celastroides*, 443
 — *novoguineensis*, 443
Dryopteris fragrans, 8
 — *Linnaeana*, 8
 — *Robertiana*, 8
 — *spinulosa*, 8
 — *dilatata*, 8
Dysoxylum Gobara, 173.
 — *procerum*, 173
Echinocarpus sinensis, 182
Echinocystis lobata, 25
Elaeagnus commutata, 21
 — *Delavayi*, 186
 — *Loureirii*, 186
Elaeocarpus limiteanus, 181
 — *linearifolius*, 181

- Elaeocarpus Maclurei*, 181
 — *Petelotii*, 181
Eleocharis palustris major, 12
Elmerrillia papuana, 441
Elymus glaucus, 10
Embelia oblongifolia, 354
 — *polypodioides*, 354
Emmotum, 480
 — Sect. *Brevistyla*, 480
 — Subg. *Euemmotum*, 480
 — Sect. *Longistyla*, 480
 — Subg. *Pogopetalum*, 480
 — *acuminatum*, 486
 — *affine*, 490
 — *apogon*, 493
 — *argenteum*, 485
 — *conjunctum*, 491
 — *fagifolium*, 492
 — *floribundum*, 487
 — *fulvum*, 493
 — *glabrum*, 488
 — *holosericeum*, 490
 — *nitens*, 483
 — *angustifolium*, 485
 — *nudum*, 485
 — *orbiculatum*, 489
 — *orbiculatum*, 485
Endiandra Archboldiana, 153
 — *Brassii*, 146
 — *Clemensii*, 147
 — *fulva*, 150
 — *glandulosa*, 148
 — *glauc*, 150
 — *grandifolia*, 146
 — *hainanensis*, 461
 — *impressicosta*, 151
 — *Ledermannii*, 149
 — *Merrilliana*, 149
 — *montana*, 152
 — *solomonensis*, 152
 — *sphaerica*, 150
 — *Teschneriana*, 152
Epilobium densum, 22
 — *palustre monticola*, 22
Epiprinus, 53
 — subgen. *Euepiprinus*, 53
 — subgen. *Symphyllia*, 53
 — *lanceifolius*, 53
 — *mallotiformis*, 53
 — *siletianus*, 53
Equisetum arvense serotina, 8
 — *fluviale*, 8
Erigeron angulosus kamtschaticus, 25
 — *caespitosus*, 26
 — *canadensis*, 26
 — *elatus*, 25
 — *elongatus*, 25
Erigeron jucundus, 26
Eriophorum angustifolium, 12
 — *medium*, 12
 — *viridicarinarum*, 12
Erucastrum gallicum, 17
Erycibe subspicata, 192
Erysimum cheiranthoides, 18
Eucalyptus clavigera, 85
 — *papuana*, 86
 — *tereticornis*, 86
 — *terminalis*, 86
Eugenia argyrocalyx, 264
 — *Bartonii*, 250
 — *bibracteata*, 249
 — *Brassii*, 247
 — *Buettneriana*, 295
 — *cornifolia*, 278
 — *Daphne*, 254
 — *daphnoides*, 270
 — *decipiens*, 281
 — *duplomarginata*, 249
 — *effusa*, 292
 — *finisterrae*, 295
 — *flavescens*, 278
 — *Forbesii*, 261
 — *garcinioides*, 249
 — *glomerata*, 250
 — *hemilampra*, 248
 — *jamboisoides*, 262
 — *javanica*, 259
 — *laevifolia*, 248
 — *LeHuntei*, 250
 — *longipes*, 274
 — *malaccensis*, 269
 — *merokensis*, 250
 — *micrandra*, 294
 — *monetaria*, 249
 — *neurocalyx*, 289
 — *nivifera*, 250
 — *nutans*, 263
 — *pergamacea*, 250
 — *plumea*, 296
 — *porphyrocarpa*, 250
 — *pterocalyx*, 253
 — *pyrocarpa*, 280
 — *rubropunctata*, 268
 — *salicina*, 254
 — *salomonensis*, 273
 — *salpingantha*, 250
 — *Schumanniana*, 289
 — *scolopacina*, 241
 — *sogerensis*, 250
 — *subalata*, 249
 — *sylvana*, 295
 — *trichotoma*, 250
 — *trivenis*, 288
 — *Vandewateri*, 249

- Eugenia Wollastonii*, 249
 — *xylantha*, 280
Eupatorium odoratum, 197
Euphorbia glyptosperma, 21
 — *serpyllifolia*, 21
Euphorbiaceae from the tropical Far East,
 New and critical, 495
Euphorbiaceae from the tropical Far East,
 On certain, 29
Euphrasia subarctica, 24
Eupomatia Belgraveana, 367
Fagopyrum esculentum, 14
Fagraea Archboldiana, 412
 — *aurantiodora*, 415
 — *Bodenii*, 414
 — *Cambagei*, 413
 — *elata*, 413
 — *obtusifolia*, 415
 — *papuana*, 414
 — *salomonensis*, 415
Fenzlia obtusa, 89
Festuca saximontana, 9
Ficus heterostyla, 158
 — *pubilimba*, 159
Fissistigma villosissimum, 163
 — *villosum*, 164
Flueggea Spirei, 32
Fluminia festucacea, 9
Gaillardia aristata, 26
Galbulimima, 367
 — *baccata*, 368
 — *Belgraveana*, 367
 — *nitida*, 368
 — *parvifolia*, 368
Galium aparine, 25
Gaura chinensis, 407
Geniostoma Archboldianum, 408
 — *Brassii*, 409
 — *Gilgii*, 409
 — *obtusum*, 410
 — *Randianum*, 409
 — *stenophyllum*, 409
Genista triflora, 378
Gentiana cephalantha, 190
Geranium nemorale Bicknellii, 21
Geum aleppicum strictum, 20
 — *strictum*, 20
Glinus oppositifolius, 386
 — *Spergula*, 386
Glockidion flavum, 36
Glyceria grandis, 9
Gomphandra Chingiana, 175
 — *mollis*, 175
 — *Petelotii*, 176
Gompholobium papuanum, 400
Goniocarpus scaber, 407
Goodyera decipiens, 13
Goodyera repens, 13
Grindelia perennis, 25
Guarea disyphonia, 173
 — *Gobara*, 173
 — *procera*, 173
Gymnema affine, 191
 — *alterniflorum*, 191
 — *formosanum*, 192
Gynostemma elongatum, 196
 — *integrifolium*, 196
Haasia borneensis, 445
Habenaria viridis interjecta, 13
Hackelia deflexa, 23
Halenia deflexa, 23
Haloragis acanthocarpa, 407
 — *chinensis*, 407
 — *nemorosa*, 408
 — *scabra*, 407
 — — *elongata*, 407
Hansemannia gawadensis, 392
 — *mollis*, 393
Hardwickia alternifolia, 399
Hartighsea Gobara, 173
Hedyotis Linnaeus versus *Oldenlandia*
 Linnaeus and the status of *Hedyotis*
 lancea Thunberg in relation to *H. con-*
 sanguinea Hance, 226
Hedyotis caudatifolia, 228
 — *consanguinea*, 228
 — *effusa*, 193
 — *lancea*, 228, 229
 — *longiexserta*, 229
 — *minutopuberula*, 229
 — *nigrescens*, 193
 — *Parryi*, 193
 — *subdivaricata*, 193
 — *tetragularis*, 193
Hedysarum alpinum grandiflorum, 20
 — *boreale*, 20
 — *cephalotes*, 170
 — *triangulare*, 170
Helianthus annuus, 26
 — *giganteus*, 26
Helicia brevipetiolata, 160
 — *hainanensis*, 159
Hemsleya elongata, 196
Hesperis matronalis, 18
Himantandra, 367
 — *baccata*, 367
 — *Belgraveana*, 367
 — *nitida*, 368
 — *parvifolia*, 368
Himantandraceae, A nomenclatural note
 on the, 366
Homalium tonkinense, 185
Hordeum jubatum, 10

- HOWARD, RICHARD A. Studies of the Icacinaceae, II. Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icacinaceae, 55
 — Studies of the Icacinaceae, III. A revision of Emmotum, 479
 Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icacinaceae. Studies of the Icacinaceae, II, 55
 Humirianthera ampla, 76
 — *crispula*, 77
 — *Duckei*, 76
 — *rupestris*, 75
 Hydrangea *indochinensis*, 167
 Hypericum majus, 21
 Icacina dubia, 63
 — *Poeppigiana*, 58
 — *senegalensis*, 66
 Icacinaceae, II. Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icacinaceae, Studies of the, 55
 Icacinaceae, III. A revision of Emmotum, Studies of the, 479
 Illigera cordata, 166
 — *cordata*, 165
 — *mollissima*, 165
 — *Petelotii*, 165
 — *yaoshanensis*, 166
 Impatiens biflora, 21
 Indosasa *angustata*, 93
 — *gibbosa*, 93
 — *solearis*, 94
 Ipomoea cairica, 192
 — *palmata*, 192
 Isomerocarpa, 442
 — *novoguineensis*, 443
 Iva axillaris, 26
 — *xanthifolia*, 26
 Ixora *cephalophora*, 194
 — *diversifolia flexilis*, 195
 — *flexilis*, 195
 Jambosa *aeorantha*, 249
 — *alutacea*, 270
 — *attenuata*, 295
 — *auriculata*, 286
 — *brevicyma*, 261
 — *Bruynii*, 249
 — *caryophylloides*, 264
 — *cladoptera*, 249
 — *combretiflora*, 286
 — *cornifolia*, 278
 — *decoriflora*, 249
 — *dolichophylla*, 249
 — *dolichostyla*, 272
 — *eximiflora*, 253
 — *floribunda*, 268
 — *Jambosa gonatantha*, 256
 — *goniocalyx*, 262
 — *gonioptera*, 259
 — *hylocharis*, 249
 — *hylophila*, 273
 — *javanica*, 259
 — *keroantha*, 271
 — *Keysseri*, 253
 — *lagynocalyx*, 249
 — *Leonhardi*, 258
 — *longipes*, 274
 — *leptopoda*, 274
 — *megalosperma*, 264
 — *micrantha*, 249
 — *najadum*, 249
 — *nutans*, 263
 — *ovalifolia*, 260
 — *pachyantha*, 249
 — *pachyclada*, 258
 — *phacelantha*, 249
 — *Pilgeriana*, 255
 — *platycarpa*, 278
 — *polyphlebia*, 249
 — *pteropoda*, 263
 — *pycnantha*, 259
 — *riparia*, 249
 — *Roemeri*, 275
 — *rubella*, 275
 — *sabangensis*, 249
 — *Sargentiana*, 249
 — *Schumanniana*, 289
 — *soliflora*, 254
 — *synaptoneura*, 249
 — *Thomsoni*, 249
 — *trachyantha*, 249
 — *tricolor*, 255
 — *tympanantha*, 255
 — *verniciiflora*, 249
 — *Versteegii*, 256
 — *xylopiacea*, 249
 Janipha *aesculifolia*, 218
 — *carthagenensis*, 217
 — *Manihot angustiloba*, 221
 Jasminum trineuron, 188
 Juncus alpinus *insignis*, 13
 — — *rariflorus*, 13
 — — *bufonius*, 13
 — *castaneus*, 13
 — *Dudleyi*, 13
 — *Richardsonianus*, 13
 Killipiodendron, 231
 — *colombianum*, 231
 Killipiodendron, Studies in the Theaceae, XI, 231
 Kingiodendron alternifolium, 399
 Knema *Petelotii*, 164
 Kobresia Bellardi, 12

- KOBUSKI, CLARENCE E. Studies in the Theaceae, XI. Killipiodendron, 231
 — Studies in the Theaceae, XII. Notes on the South American species of Ternstroemia, 298
 — Studies in the Theaceae, XIII. Notes on the Mexican and Central American species of Ternstroemia, 464
- Lactuca biennis, 27
 — scariola integrifolia, 27
 — *spicata*, 27
- Lappula echinata, 23
- Lathyrus ochroleucus, 20
- Lauraceae, IV. Preliminary study of the Papuan species collected by the Archbold Expeditions, Studies in the, 112
- Lauraceae, V. Some eastern Asiatic species of Beilschmiedia and related genera, Studies in the, 444
- Lauromerrillia, 460
 — *appendiculata*, 460
- Ledum palustre decumbens, 23
- Lembotropis triflora, 378
- Lemna trisulca, 13
- Lepidium *Draba*, 17
 — *sativum*, 17
- Leretia, Mappia and Nothapodytes, valid genera of the Icacinaceae, Studies of the Icacinaceae, II. Humirianthera, 55
- Leretia *ampla*, 76
 — *angustifolia*, 62
 — *cordata*, 58
 — *glabrata*, 60
 — *mexicana*, 61
 — *nitida*, 58
 — *paniculata*, 60
 — *parviflora*, 60
 — *Poeppigiana*, 58
 — *racemosa*, 62
 — *brachycarpa*, 64
 — *Vellozii*, 58
- Lesquerella arctica, 17
- Lilium philadelphicum andinum, 13
- Limosella aquatica, 24
- Linaria minor, 24
 — *reticulata*, 24
 — *vulgaris*, 24
- Lingnania *atra*, 98
 — *cerosissima*, 101
 — *parviflora*, 101
 — *remotiflora*, 101
 — *sesquiflora*, 99
- Linociera *macrothyrsa*, 189
 — *subcapitata*, 189
- Linum usitatissimum, 21
- Litsea *alveolata*, 121
 — *bernhardensis*, 125
 — *Litsea Brassii*, 125
 — *breviumbellata*, 121
 — *complanata*, 128
 — *crenata*, 120
 — *domarensis*, 128
 — *fulvosericea*, 120
 — *habbemensis*, 123
 — *mafuluensis*, 129
 — *morobensis*, 124
 — *papillosa*, 123
 — *perglabra*, 126
 — *perlucida*, 124
 — *solomonensis*, 127
 — *Versteeghii*, 122
 — *Whiteana*, 125
- Lomatium foeniculaceum, 22
- Lonicera involucrata, 25
 — *notha*, 25
 — *oreodoxa*, 381
 — *Rockii*, 380
 — *Ruprechtiana* × *tartarica*, 25
- Luzula arcuata, 13
- Lychnis alba, 16
 — *Drummondii*, 16
- Lycopodium clavatum, 8
- Lyonia *annamensis*, 188
 — *chapaensis*, 188
- Macaranga Poilanei, 51
 — *rosuliflora*, 51
 — *trigonostemonoides*, 51
- Madia glomerata, 26
- Maesa perlarius, 344
 — *sinensis*, 344
 — *tonkinensis*, 344
 — — *annamensis*, 344
 — — *Bonii*, 344
 — — *macrodonata*, 344
 — — *montana*, 344
- Mallotus *Caput-Medusae*, 48
 — *Tsiangii*, 51
- Malva neglecta, 21
 — *rotundifolia*, 21
- Manihot in North America, A study of, 216
- Manihot *aesculifolia*, 218
 — *angustiloba*, 223
 — *carthagenensis*, 217
 — *carthaginensis*, 222
 — *chlorosticta*, 222
 — *colimensis*, 221
 — *Davisiae*, 224
 — *gualanensis*, 218
 — *intermedia*, 221
 — *isoloba*, 223
 — *ludibunda*, 219
 — *mexicana*, 220
 — *parvicocca*, 219

- Manihot rhomboidea*, 219
 — *rubricaulis*, 222
Maniltoa Brassii, 398
 — *cynometroides*, 397
 — *plurijuga*, 398
Mappia and *Nothapodytes*, valid genera of the Icacinaceae, Studies of the Icacinaceae, II. Humirianthera, Leretia, 55
Mappia § *Trichocrater*, 66
 — *affinis*, 63
 — *ampla*, 76
 — *angustifolia*, 62
 — *cambodiana*, 70
 — *Championiana*, 70
 — *cordata*, 58
 — *dimorpha*, 68
 — *foetida*, 70
 — *Gardneriana*, 70
 — *mexicana*, 61
 — *montana*, 67
 — *nitida*, 58
 — *oblonga*, 70
 — *obtusifolia*, 70
 — *origanoides*, 66
 — *ovata*, 70
 — *philippinensis*, 66, 73
 — *pittosporoides*, 68
 — *Poeppigiana*, 58
 — *racemosa*, 63
 — — *brachycarpa*, 64
 — — *typica*, 64
 — *senegalensis*, 66
 — *tomentella*, 70
 — *tomentosa*, 70
 — *Wightiana*, 70
Mastixiodendron pachyclados, 416
Matricaria inodora, 26
 — *maritima agrestis*, 26
 — *matricarioides*, 26
 McCURE, F. A. New Bamboos, and some new records, from French Indo-China, 93
Mearnsia cordata, 81
 — *ovata*, 81
 — *scandens*, 81
Medicago falcata, 20
 — *lupulina*, 20
 — *sativa*, 20
Melaleuca Cunninghamii, 87
 — — *glabra*, 87
 — *Leucadendron*, 88
 — — *Cunninghamii*, 87
 — — *minor*, 88
 — — *sanguinea*, 87
 — *symphyocarpa*, 89
 — — *aurantiaca*, 89
 — *viridiflora*, 89
Melilotus alba, 20
 — *officinalis*, 20
Meliosma angustifolia, 179
 — *coriacea*, 178
 — *crassifolia*, 179
 — *longipes*, 178
Melodinus brachyphyllus, 191
Melodorum villosum, 164
 MERRILL, E. D. Records of Indo-Chinese plants, III, 156
 — & F. P. METCALF. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, 226
 — & L. M. PERRY. *Plantae Papuanae Archboldianae*, IX, X, 233, 383
 METCALF, F. P. & E. D. MERRILL. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, 226
Metrosideros ornata, 79
 — *parallelinervis*, 79
 — *parviflora*, 80
 — *Pullei*, 80
 — — *parvifolia*, 80
 — *Regeli*, 81
 — *sp.*, 79
Mezoneurum Scortechinii, 399
Microtropis rhynchocarpa, 174
Milletia australis, 401
Mimosa pennata, 396
Mitrasacme alsinoides, 410
Mokofua alnifolia, 310
 — *andina*, 325
 — *brasiliensis*, 314
 — *carnosa*, 335
 — *clusiaefolia*, 336
 — *congestiflora*, 316
 — *crassifolia*, 338
 — *cuneifolia*, 340
 — *delicatula*, 308
 — *dentata*, 331
 — *laevigata*, 332
 — *longipes*, 337
 — *Lorentzii*, 335
 — *meridionalis*, 325
 — *oleaeifolia*, 330
 — *punctata*, 307
 — *Ruiziana*, 342
 — *Schomburgkiana*, 313
 — *Seemannii*, 471
 — *silvatica*, 473
 — *tepezapote*, 475
 — *venosa*, 342
 — *verticillata*, 333
Mollugo oppositifolia, 386

- Mollugo pentaphylla*, 386
 — *stricta*, 386
Monolepis Nuttalliana, 15
Monotropa uniflora, 22
Montia lamprosperma, 386
Mucuna Baileyana, 404
 — *brachycarpa*, 405
 — *discolor*, 405
 — *elegans*, 406
Muhlenbergia squarrosa, 11
Myrioneuron effusum, 195
 — *nutans effusa*, 195
Myriophyllum exalbescens, 22
 — *spicatum*, 22
Myrsinaceae, New and critical Chinese and Indo-Chinese, 344
Myrsine marginata, 354
 — *stolonifera*, 354
Myrtaceae, Some Papuan, 79
Myrtella Beccarii, 90
Myrtus acuminatissima, 247
 — *Archboldiana*, 239
 — *Brassii*, 239
 — *flavida*, 242
 — *nivalis*, 236
 — *Randiana*, 237
 — *samarangensis*, 259
 — *Versteeghii*, 238
Nelitris Coriandri, 234
Neoleretia, 66
 — *dimorpha*, 68
 — *foetida*, 70
 — *philippinensis*, 73
 — *pittosporioides*, 68
Neolitsea Archboldiana, 118
 — *Brassii*, 118
 — *Teschneriana*, 119
Nephrostylus Poilanei, 51
Neslia paniculata, 17
 New and critical Chinese and Indo-Chinese *Myrsinaceae*, 344
 New and critical *Euphorbiaceae* from the tropical Far East, 495
 New bamboos, and some new records, from French Indo-China, 93
 New species of *Croton* L. from New Guinea, 369
 New species, varieties and combinations from the collections of the Arnold Arboretum, 377
 Nomenclatural note on the *Himantandraceae*, A, 366
 Notes on the rooting of some conifers from cuttings, 103
Nothaphoebe Archboldiana, 115
Nothapodytes, valid genera of the *Icacinaceae*, Studies of the *Icacinaceae*, II, Humirianthera, Leretia, Mappia and, 55
Nothapodytes, 66
 — *dimorpha*, 68
 — *foetida*, 70
 — *montana*, 67
 — *obtusifolia*, 70
 — *philippinensis*, 73
 — *pittosporioides*, 68
Nymphaea Brownii, 389
 — *dictyophlebia*, 390
 — *macrosperma*, 389
 — *violacea*, 389
Oenanthe sarmentosa, 22
Oenothera strigosa, 22
Oldenlandia Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, *Hedyotis* Linnaeus versus, 226
Oldenlandia consanguinea, 228
 — *lancea*, 228
 — *subdivaricata*, 193
 — *tetragonalis*, 193
 On certain *Euphorbiaceae* from the tropical Far East, 29
Opuntia fragilis, 21
Ormosia calavensis, 400
Ostodes Katherinae, 507
Oxytropis Paysoniana, 20
 — *retrorsa*, 20
Panax pseudo-ginseng, 187
 Papuan Plants, V, Studies of, 417
Paracleisthus Eberhardtii, 39
 — *Pierrei*, 39
 — *tonkinensis*, 39
Paris Delavayi, 157
 — *Fargesii*, 157
 — *hainanensis*, 157
Parkia Versteeghii, 396
Parnassia palustris neogaea, 19
 — *parviflora*, 19
Passiflora pertriloba, 186
Pastinaca sativa, 22
Patascuya Steubellii, 343
Pedicularis labradorica, 24
 — *Langsdorfii*, 24
Penstemon Gormanii, 24
 — *procerus*, 24
 PERRY, L. M. & E. D. MERRILL. *Plantae Papuanae Archboldianae*, IX, X, 233, 383
Phacelia tanacetifolia, 23
Phalaris arundinacea, 11
 — *canariensis*, 11
Phanera coccinea, 170
Phoebe Clemensii, 114

- Phyllanthodendron* § *Calophyllum*, 34
 — § *Euphyllanthodendron*, 33
 — § *Pseudoactephila*, 33
 — *album*, 35
 — *anthopotamicum*, 37
 — *carinatum*, 36
 — *Cavaleriei*, 37
 — *coriaceum*, 35
 — *dubium*, 36
 — *Dunnianum*, 37
 — — *hypoglaucum*, 37
 — *lativenium*, 36
 — *ligulatum*, 33, 34
 — *mirabile*, 34
 — *Poilanei*, 34
 — *roseum*, 33, 35
 — — *siamensis*, 35
 — *siamense*, 35
 — *yunnanense*, 36
Phyllanthus albus, 35
 — *anthopotamicus*, 37
 — *carinatus*, 36
 — *discofractus*, 31
 — *Dunnianus*, 37
 — *lingulatus*, 34
 — — *tonkinensis*, 34
 — *mirabilis*, 34
 — *nobilis genuinus*, 31
 — *Petelotii*, 30
 — *Poilanei*, 34
 — *roseus*, 35
 — — *glabrum*, 35
 — *rubicundus*, 38
 — *sinicus*, 31
Picea Engelmanni, 8
 — *glauca albertiana*, 8
Pieris annamensis, 188
 — *chapaensis*, 188
Pinus Banksiana, 8
 — *divaricata*, 8
Piptadenia novo-guineensis, 396
Pithecellobium Clypearia velutinum, 394
 — *novo-guineense*, 394
 — *palauense*, 393
Pithecolobium palauense, 393
Plantae Papuanae Archboldianae, IX, X,
 233, 383
Plantago lanceolata, 25
 — *major*, 25
Pleomele terniflora, 157
Pleurisanthes parviflora, 60
Poa abbreviata, 10
 — *annua*, 10
 — *compressa*, 10
 — *nervosa*, 10
 — *trivialis*, 10
Podadenia javanica, 49
Podadenia sapida, 48
 — *Thwaitesii*, 48
Pogonpetalum, 480
 — *acuminatum*, 486
 — *acutum*, 492
 — *affine*, 490
 — *nitens*, 483
 — *orbiculatum*, 489
Polemonium lanatum humile, 23
 — *occidentale*, 23
 — *rotatum*, 23
Polygala Senega, 21
Polygonum achoreum, 14
 — *benguetense*, 384
 — *coccineum*, 14
 — *Convolvulus*, 14
 — *Douglasii*, 14
 — *lapathifolium*, 385
 — *macranthum*, 161
 — *minus decipiens*, 385
 — — *depressum*, 385
 — *praetermissum*, 161
 — *runcinatum papuanum*, 385
 — *scabrum*, 14
 — *Thunbergii*, 161
 — *tomentosum*, 14
Portulaca quadrifida, 386
Potamogeton Friesii, 9
 — *pectinatus*, 9
 — *praelongus*, 9
 — *pusillus tenuissimus*, 9
 — *Richardsonii*, 9
Potentilla Anserina, 20
 — *biflora*, 19
 — *glabrella*, 19
 — *gracilis Nuttallii*, 19
 — *Hippiana*, 20
 — *millegrana*, 19
 — *norvegica hirsuta*, 19
Prenanthes racemosa, 27
Primula egaliksensis violacea, 23
Psychotria siamica, 195
 — *Thorelii*, 195
Pterocarpus australis, 401
Ptychopyxis subg. *Neocalpigyne*, 48
 — subg. *Podadenia*, 48
 — *angustifolia*, 48
 — *bacciformis*, 49
 — *Caput-Medusae*, 48
 — *costata*, 48
 — *frutescens*, 49
 — *javanica*, 49
 — *philippina*, 49
 — *Poilanei*, 50
 — *Thwaitesii*, 48
Puccinellia airoides, 10
 — *distans tenuis*, 9

- Puccinellia Nuttalliana*, 10
Pygeum affine, 168
 — *brachybotrys*, 169
Pyrola asarifolia, 22
 — *secunda*, 22
Radicula Armoracia, 18
Ranunculus acris, 16
 — *Gmelini Purshii*, 16
 — *hyperboreus*, 16
 — *pennsylvanicus*, 16
 — *trichophyllus typicus*, 16
Rapanea capitellata macrocarpa, 355
 — — *microcarpa*, 355
 — *neriifolia*, 355
 — — *yunnanensis*, 355
 RAUP, HUGH M. Additions to a catalogue of the vascular plants of the Peace and Upper Liard River regions, 1
 Records of Indo-Chinese plants, III, 156
 REHDER, ALFRED. New species, varieties and combinations from the collections of the Arnold Arboretum, 377
Rhamnus subapetalus, 179
Rhinanthus Kyrollae, 24
Rhodamnia cinerea, 90
 — *spongiosa*, 90
Rhododendron oxyphyllum, 188
Rhodomyrtus calophlebia, 91
 — *macrocarpa*, 90
 — *novoguineensis*, 90
 — *pinnatinervis*, 90
 — *trineura*, 91
Ribes hirtellum, 19
 Rootings of some conifers from cuttings, Notes on the, 103
Rorippa islandica hispida, 18
 — — *microcarpa*, 18
 — *palustre hispida*, 18
Rourea simulans, 391
Rubus arcticus, 19
 — *barbatus*, 377
 — *idaeus aculeatissimus albus*, 377
 — — *albus*, 377
 — — *albus*, 377
 — — *strigosus albus*, 377
 — — *succineus*, 377
 — — *vulgatus luteofructifer*, 377
 — *nutans*, 377
 — *parviflorus bifarius*, 19
 — *pedatus*, 19
 — *strigosus albus*, 377
Rumex Acetosella, 14
 — *Brownii*, 384
 — *mexicanus*, 14
 — *nepalensis*, 162
Sagina belonophylla, 387
 — *echinosperma*, 388
Sagina papuana, 388
Salicornea europaea, 15
Salix discolor, 14
 — *glauca*, 14
 — *MacCalliana*, 13
 — *Scouleriana*, 14
Salsola Kali tenuifolia, 15
Sanguisorba canadensis latifolia, 20
 — *sitchensis*, 20
Sapium plumerioides, 507
Satureja origanoides, 66
Saurauia macrotricha, 183
Schima khasiana macrocarpa, 184
 — — *sericans*, 184
Schizostachyum hainanense, 101
 — *pseudolima*, 101
Schleinitzia microphylla, 396
Schnizleinia nitida, 485
Secale cereale, 10
Securinea Spirei, 32
Senecio palustris, 27
 — *Purshianus*, 27
 — *vulgaris*, 27
Serianthes Ledermannii, 393
 — *minahassae*, 393
Setaria viridis, 12
Siagonanthus sericeus, 483
Silene latifolia, 16
 — *repens*, 16
Sinobambusa gibbosa, 93
Sisymbrium altissimum, 17
Sloanea sinensis, 182
 SMITH, A. C. A nomenclatural note on the Himantandraceae, 366
 — Studies of Papuan Plants, V, 417
 — & I. W. BAILEY. Degeneriaceae, a new family of flowering plants from Fiji, 356
Solanum nigrum, 24
 — *triflorum*, 24
Solidago decumbens oreophila, 25
 Some Papuan Myrtaceae, 79
Sonchus arvensis, 27
 — — *glabrescens*, 28
 — *asper*, 28
 — *oleraceus*, 28
Sorbaria sorbifolia, 19
Sorbus scopulina, 19
Sparganium multipedunculatum, 9
Spartocytisus triflorus, 378
Spiradiclis caespitosa, 195
 — *leptobotrys longiflora*, 195
Spirodela polyrrhiza, 13
Stachys palustris pilosa, 23
 Staff of the Arnold Arboretum, 1941–42, 522

- STEARNS, WILLIAM T. Bonpland's "Description des plantes rares cultivées à Malmaison et à Navarre," 110
- Stellaria calycantha*, 15
- *crispa*, 15
- *laxa*, 387
- *media*, 15
- *saxatilis*, 386
- *stellato-pilosa*, 387
- Stemonurus Chingianus*, 175
- *foetidus*, 70
- Sterculia Henryi*, 182
- Stipa columbiana*, 11
- *Richardsonii*, 11
- Streptopus amplexifolius americanus*, 13
- Strongylodon Archboldianus*, 403
- Studies in the Lauraceae, IV. Preliminary study of the Papuan species collected by the Archbold Expeditions, 112
- Studies in the Lauraceae, V. Some eastern Asiatic species of *Beilschmiedia* and related genera, 444
- Studies in the Theaceae, XI. *Killipiodendron*, 231
- Studies in the Theaceae, XII. Notes on the South American species of *Ternstroemia*, 298
- Studies in the Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*, 464
- Studies of Papuan Plants, V, 417
- Studies of the Icacinaceae, II. *Humiranthera*, *Leretia*, *Mappia* and *Nothapodytes*, valid genera of the Icacinaceae, 55
- Studies of the Icacinaceae, III. A revision of *Emmotum*, 479
- Study of *Manihot* in North America, A, 216
- Suaeda depressa*, 15
- Symphoricarpos albus*, 25
- Symphyllia*, 53
- *mallotiformis*, 53
- *siletiana*, 53
- Symplocarpon Purpusii*, 478
- Syndiclis chinensis*, 462
- Syzygium acetosum*, 280
- *acmenoides*, 291
- *adelphicum*, 292
- *adenanthum*, 292
- *aeoranthum*, 249
- *alutaceum*, 270
- *anomalum*, 250
- *Archboldianum*, 271
- *argyrocalyx*, 264
- *attenuatum*, 295
- *badium*, 281
- *Bartonii*, 250
- *Syzygium bibracteatum*, 249
- *bicolor*, 286
- *bracteosum*, 250
- *Brassii*, 277
- *brevicymum*, 261
- *Bruynii*, 249
- *Buettnerianum*, 295
- *callianthum*, 252
- *camptodromum*, 285
- *capituliferum*, 287
- *cartilagineum*, 287
- *caryophylloides*, 264
- *caudiferum*, 272
- *cinctum*, 272
- *cladopterum*, 249
- *combretiflorum*, 286
- *cornifolium*, 278
- *Daphne*, 254
- *daphnoides*, 270
- *decipiens*, 281
- *decoriflorum*, 249
- *delicatum*, 273
- *dictyophlebium*, 267
- *Dielsianum*, 259
- *discolor*, 274
- *Doctersii*, 283
- *dolichophyllum*, 249
- *dolichostylum*, 272
- *duplomarginatum*, 249
- *effusum*, 292
- *evenulosum*, 261
- *eximiflorum*, 252
- *finisterrae*, 295
- *flavescens*, 278
- *floribundum*, 268
- *folidorhachis*, 276
- *Forbesii*, 261
- *furfuraceum*, 276
- *ganophyllum*, 293
- *garcinioides*, 249
- *gonatanthum*, 256
- *goniocalyx*, 262
- *goniopterum*, 259
- *Grevesianum*, 253
- *heterobotrys*, 257
- *hylochare*, 249
- *hylophilum*, 273
- *insculptum*, 267
- *jambosoides*, 262
- *japense*, 288
- *keroanthum*, 271
- *Keysseri*, 253
- *kietanum*, 279
- *lagerstroemioides*, 262
- *lagynocalyx*, 249
- *laqueatum*, 257

Syzygium Lauterbachianum, 268

- **phaeophloium**, 268
- **LeHuntei**, 250
- **Leonhardi**, 258
- **leptanthum**, 296
- **leptoneurum**, 284
- **leptophlebioides**, 282
- **leptopodium**, 284
- **longipes**, 274
- **leptopodum**, 274
- **Lorentzianum**, 288
- **macrocalyx**, 253
- **malaccense**, 269
- **maschalocladum**, 284
- **megalospermum**, 264
- **megistophyllum**, 279
- **merokense**, 249
- **micrandrum**, 294
- **micropetalum**, 293
- **modestum**, 288
- **monetarium**, 249
- **multiglandulosum**, 269
- **myriadenum**, 293
- **najadum**, 249
- **nemorale**, 280
- **niviferum**, 250
- **novo-guineense**, 286
- **nutans**, 263
- **obtusum**, 294
- **onesimum**, 296
- **ovalifolium**, 260
- **pachyanthum**, 249
- **pachycladum**, 258
- **pallens**, 251
- **papuasicum**, 251
- **pergamaceum**, 250
- **phacelanthum**, 249
- **phaeostictum**, 270
- **Pilgerianum**, 255
- **platycarpum**, 278
- **plumeum**, 296
- **polyphlebium**, 249
- **porphyrocarpum**, 250
- **pteropodium**, 263
- **puberulum**, 263
- **pyriforme**, 259
- **pyrocarpum**, 280
- **Randianum**, 264
- **Rechingeri**, 249
- **rectangulare**, 282
- **retivenium**, 294
- **Richardsonianum**, 274
- **riparium**, 249
- **Roemeri**, 275
- **rosaceum**, 283
- **roseum**, 270
- **rostratum**, 297

Syzygium rubellum, 275

- **rubiginosum**, 289
 - **rubropunctatum**, 268
 - **sabangense**, 249
 - **saliciforme**, 253
 - **salicinum**, 254
 - **salomonense**, 273
 - **salpinganthum**, 250
 - **samarangense**, 259
 - **Sargentianum**, 249
 - **Schumannianum**, 289
 - **sogerense**, 250
 - **soliflorum**, 254
 - **spectabile**, 265
 - **squamatum**, 277
 - **subalatum**, 249
 - **subamplexicaule**, 285
 - **subcorymbosum**, 297
 - **subglobosum**, 290
 - **sylvanum**, 295
 - **synaptoneurum**, 249
 - **thalassicum**, 258
 - **Thomsoni**, 249
 - **torricellianum**, 252
 - **trachyanthum**, 249
 - **trichotomum**, 250
 - **tricolor**, 255
 - **trivene**, 288
 - **tympananthum**, 255
 - **uniflorum**, 255
 - **vaccinioides**, 256
 - **Vandewateri**, 249
 - **vernificlorum**, 249
 - **vernicosum**, 260
 - **Versteegii**, 256
 - **virescens**, 260
 - **Warburgii**, 250
 - **Waterhousei**, 290
 - **Wollastonii**, 249
 - **xylanthum**, 280
 - **xylopiaceum**, 249
- Talauma oreadam**, 441
- Taonabo alnifolia**, 310
- **andina**, 325
 - **brasiliensis**, 314
 - **Candolleana**, 311
 - **carnosa**, 335
 - **clusiaefolia**, 336
 - **congestiflora**, 316
 - **crassifolia**, 338
 - **cuneifolia**, 340
 - **delicatula**, 308
 - **dentata**, 331
 - **flavifolia**, 335
 - **Jelskii**, 327
 - **Lehmannii**, 324
 - **lineata**, 478

Taonabo longipes, 337

— *Maltbyana*, 468

— *Maltbyi*, 468

— *meridionalis*, 325

— *oleaeifolia*, 330

— *oocarpa*, 475

— *Pavoniana*, 338

— *Pringlei*, 470

— *punctata*, 307

— *Schomburgkiana*, 313

— *Seemanni*, 471

— *sphaerocarpa*, 475

— *subserrata*, 340

— *sylvatica*, 473

— *tepezapote*, 475

— *verticillata*, 333

Taraxacum officinale, 27

Tellima grandiflora, 19

Tephrosia leptoclada, 400

— *maculata*, 401

Ternstroemia, Studies in the Theaceae,
XII. Notes on the South American
species of, 298

Ternstroemia, Studies in the Theaceae,
XIII. Notes on the Mexican and Cen-
tral American species of, 464

Ternstroemia alnifolia, 309

— *lancifolia*, 310

— *andina*, 325

— *asymmetrica*, 335

— *borbensis*, 305

— *brachypoda*, 332

— *brasilensis*, 314

— *minor*, 314

— *parvifolia*, 314

— *brevipes*, 321, 325

— *Blanchetii*, 322

— *brevistyla*, 310

— *Browniana*, 309

— *camelliaefolia*, 321

— *Candolleana*, 311

— *angustifolia*, 312

— *rotundata*, 311

— *carnosa*, 335

— *acutifolia*, 335

— *chalicophila*, 472

— *circumscissilis*, 304

— *clusiaefolia*, 336

— *congestiflora*, 316

— *crassifolia*, 338

— *suborbicularis*, 338

— *cuneata*, 342

— *cuneifolia*, 473

— *cuneifolia*, 340

— *glutinosa*, 340

— *dehiscens*, 304

— *delicatula*, 308

Ternstroemia dentata, 330

— *latifolia*, 331

— *multiflora*, 331

— *nudiflora*, 321

— *oblongifolia*, 331

— *opaca*, 331

— *discoidea*, 306

— *distyla*, 317

— *duidae*, 323

— *latifolia*, 324

— *dura*, 329

— *Gleasoniana*, 305

— *globiflora*, 315

— *globosa*, 315

— *globuliflora*, 315

— *grandiosa*, 318

— *Hemsleyi*, 475

— *dentobracteata*, 475

— *impressa*, 472

— *Jelskii*, 327

— *Killipiana*, 341

— *Klugiana*, 334

— *Krukoffiana*, 319

— *laevigata*, 332

— *Lehmannii*, 324

— *lineata*, 478

— *longipes*, 337

— *macrocarpa*, 321

— *Maltbyana*, 468

— *Maltbyi*, 468

— *megaloptycha*, 474

— *meridionalis*, 325

— *nigricans*, 325

— *minoriflora*, 315

— *monosperma*, 306

— *multiflora*, 331

— *Mutisiana*, 341

— *nudiflora*, 322

— *occidentalis*, 473

— *oleaeifolia*, 330

— *oligostemon*, 327

— *oocarpa*, 475

— *pachytrocha*, 320

— *paucifolia*, 324

— *Pavoniana*, 338

— *brachypoda*, 332

— *peduncularis*, 471

— *penduliflora*, 311

— *pentapetala*, 338

— *polyandra*, 333

— *Pringlei*, 470

— *punctata*, 307

— *revoluta*, 307

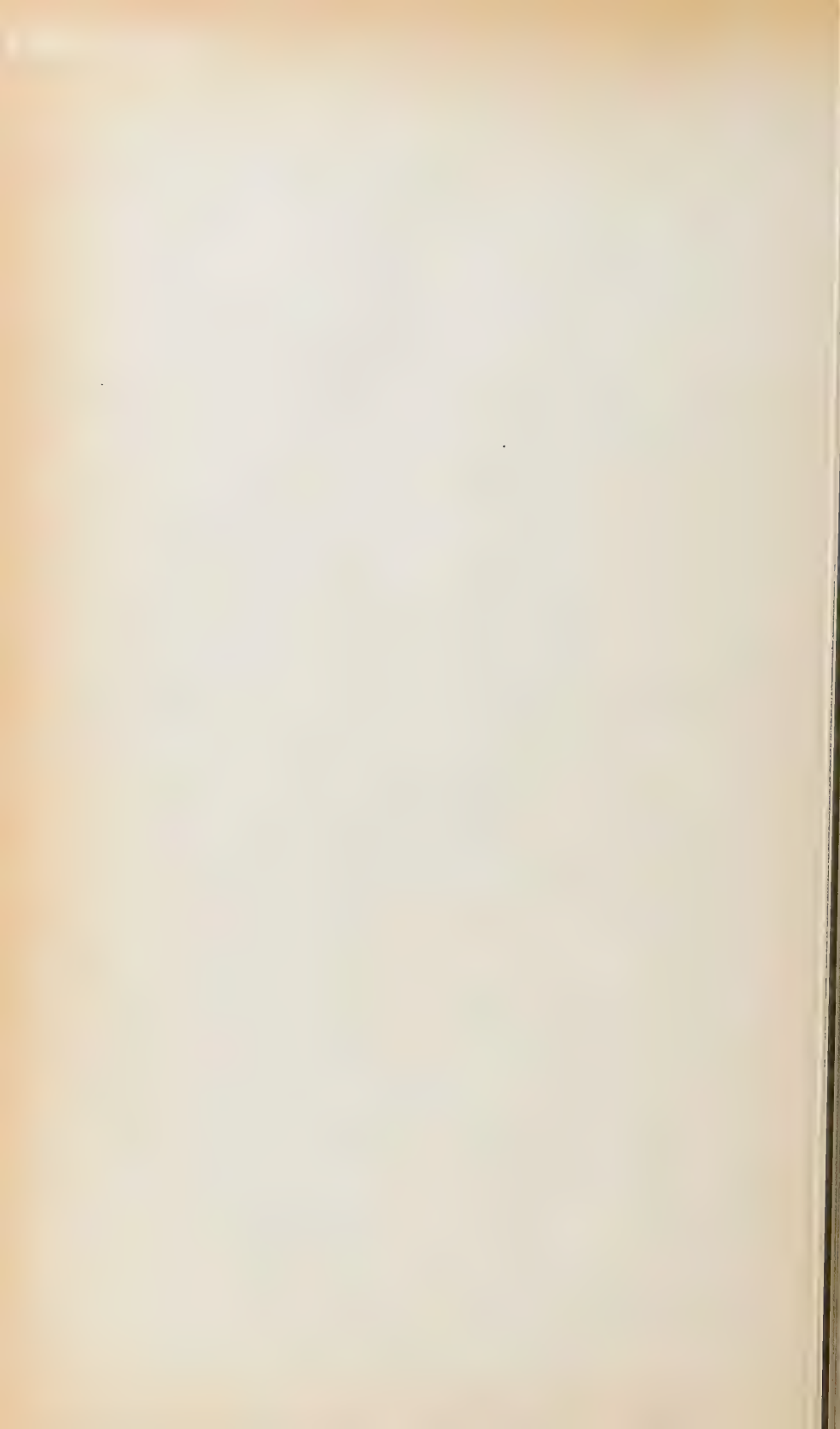
— *pungens*, 329

— *Purpusii*, 478

— *quinquepartita*, 338

— *retusifolia*, 328

- Ternstroemia revoluta*, 307
 — *roraimae*, 342
 — *rubicunda*, 342
 — *Ruiziana*, 342
 — Schomburgkiana, 313
 — Seemanni, 471
 — *Seleriana*, 475
 — *serrulata*, 478
 — *siphilitica*, 478
 — *sphaerocarpa*, 475
 — *Standleyana*, 469
 — *Steubelii*, 343
 — *subcaudata*, 312
 — *suborbicularis*, 338
 — *subserrata*, 340
 — *sylvatica*, 473
 — *Tepezapote*, 475
 — *tristyla*, 318
 — *venosa*, 342
 — *verticillata*, 333
Tetrameles nudiflora, 407
Tetrastigma chapaensis, 180
 — Henryi, 180
Tetrathalamus montana, 426
Thaspium aureum, 22
 The Arnold Arboretum during the fiscal year ended June 30, 1942, 509
 Theaceae, XI. Killipiodendron, Studies in the, 231
 Theaceae, XII. Notes on the South American species of *Ternstroemia*, Studies in the, 298
 Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*, Studies in the, 464
Thelypteris Dryopteris, 8
 — *fragrans*, 8
 — *Robertiana*, 8
 — *spinulosa*, 8
 — *dilatata*, 8
 THIMANN, KENNETH V. & ALBERT L. DELISLE. Notes on the rooting of some conifers from cuttings, 103
Thlaspi arvense, 17
Toxocarpus Gagnepainii, 192
 — *Klossii*, 192
 — *ovalifolius*, 192
Tragopogon major, 28
 — *pratensis*, 28
Trifolium hybridum, 20
 — *pratense*, 20
 — *repens*, 20
Triglochin palustre, 9
Trigonostemon asahanensis, 54
Trimenia papuana, 442
Trisetum spicatum molle, 11
Tristania ferruginea, 83
 — *longivalvis*, 84
 — *suaveolens*, 84
Typha latifolia, 9
Uranthera siamensis, 35
Urtica urens, 14
Vaccinium uliginosum, 23
Valeriana Jatamansi, 196
 — *glabra*, 196
Vatica subglabra, 184
 Vegetative propagation of eastern white pine and other five-needled pines, The, 198
Veronica alpina unalaschensis, 24
 — *Anagallis-aquatica*, 24
 — *persica*, 24
 — *Tournefortii*, 24
Viburnum edule, 25
 — *erubescens neurophyllum*, 196
 — *sempervirens*, 378
 — *trichophorum*, 378
 — *Tsangii*, 378
 — *xanthocarpum*, 380
Vicia americana angustifolia, 20
Viola arvensis, 21
 WALKER, EGBERT H. New and critical Chinese and Indo-Chinese Myrsinaceae, 344
 WHITE, C. T. Some Papuan Myrtaceae, 79
Xanthomyrtus cardiophylla, 242
 — *parvifolia*, 243
 — *Dielsiana*, 244
 — *exigua*, 246
 — *fasciculata*, 240
 — *flavida*, 242
 — *humilis*, 243
 — *Klossii*, 245
 — *brevipedunculata*, 246
 — *lanceolata*, 241
 — *longicuspis*, 241
 — *fruticosa*, 241
 — *papuana*, 244
 — *parviflora*, 244
 — *rostrata*, 240
 — *Schlechteri*, 240
 — *scolopacina*, 241
Xanthostemon crenulatus, 82
 — *papuanus*, 82
 — *paradoxus*, 83
Xenodendron polyanthum, 247
Youngia cineripappa, 197
Zizia aptera, 22
 — *cordata*, 22



VOLUME XXIII

NUMBER 4

JOURNAL OF THE ARNOLD ARBORETUM HARVARD UNIVERSITY

EDITORIAL BOARD

A. C. SMITH, <i>Editor</i>	P. C. MANGELSDORF
I. W. BAILEY	E. D. MERRILL
J. H. FAULL	H. M. RAUP
I. M. JOHNSTON	A. REHDER
C. E. KOBUSKI	K. SAX

OCTOBER, 1942



PUBLISHED BY
THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY
JAMAICA PLAIN, MASS.

1942

THE JOURNAL OF THE ARNOLD ARBORETUM

Published quarterly by the Arnold Arboretum of Harvard University.

Subscription price \$4.00 per year. Price of single numbers \$1.25.

Vols. XI-XIII: Price \$3.00 each; single numbers \$1.00 each. Vols. XIV-XXIII: Price \$4.00 each; single numbers \$1.25 each.

Vols. I-X out of print; odd numbers of the following volumes: Vol. I (no. 1), VI (no. 4), VIII (no. 4), IX (nos. 2/3), \$1.00 each.

Subscriptions and remittances should be addressed to the ARNOLD ARBORETUM, JAMAICA PLAIN, Massachusetts.

CONTENTS OF NO. 4

PLANTAE PAPUANAE ARCHBOLDIANAE, X. By <i>E. D. Merrill</i> and <i>L. M. Perry</i>	383
STUDIES OF PAPUASIAN PLANTS, V. By <i>A. C. Smith</i>	417
STUDIES IN THE LAURACEAE, V. SOME EASTERN ASIATIC SPECIES OF BEILSCHMIEDIA AND RELATED GENERA. By <i>Caroline K. Allen</i>	444
STUDIES IN THE THEACEAE, XIII. NOTES ON THE MEXICAN AND CENTRAL AMERICAN SPECIES OF TERNSTROEMIA. By <i>Clarence E. Kobuski</i> . 464	
STUDIES OF THE ICACINACEAE, III. A REVISION OF EMMOTUM. With four plates. By <i>Richard A. Howard</i>	479
NEW AND CRITICAL EUPHORBIACEAE FROM THE TROPICAL FAR EAST. By <i>Leon Croizat</i>	495
THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1942	509
BIBLIOGRAPHY OF THE PUBLISHED WRITINGS OF THE STAFF AND STUDENTS, JULY 1, 1941 - JUNE 30, 1942	519
STAFF OF THE ARNOLD ARBORETUM, 1941 - 1942	522
INDEX	523
TITLE-PAGE AND TABLE OF CONTENTS	i-iv

Vol. XXIII, No. 3, including pages 267-382 with five plates, was issued July 15, 1942

**PUBLICATIONS FOR SALE AT THE
ARNOLD ARBORETUM OF HARVARD UNIVERSITY
JAMAICA PLAIN, MASS.**

JOURNAL OF THE ARNOLD ARBORETUM. Published quarterly by the Arnold Arboretum of Harvard University. Subscription price \$4.00 per year. Price of single number \$1.25 each.

Vols. I-X out of print. Vols. XI-XIII: Price \$3.00 each. Vols. XIV-XXIII: Price \$4.00 each.

SARGENTIA; a continuation of the Contributions from the Arnold Arboretum of Harvard University. A publication issued at irregular intervals. No. 1. *Fijian Plant Studies, II.* By A. C. SMITH (AND COLLABORATORS). 148 pp. 5 figs. July 20, 1942. Price \$2.50

ARNOLDIA; a continuation of the Bulletin of Popular Information of the Arnold Arboretum. About 15 numbers per year. Subscription price \$1.00. Price of single numbers \$0.10 to \$0.25 each.

Complete sets for 1924-41 with the exception of 1927, 1936 and 1937; odd numbers of volumes published in 1912-23, 1927, 1936 and 1937 are available.

CONTRIBUTIONS FROM THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY. 1932-1938. No. 1. *The Hypodermataceae of Conifers.* By GRANT DOOKS DARKER. 131 pp. 27 pl. June 15, 1932. Price \$3.00; No. 2. *Taxonomy and Geographical Distribution of the Genus Milesia.* By JOSEPH HORACE FAULL. 138 pp. 2 figs., 9 pl. Oct. 1, 1932. Price \$3.00; No. 3. *Studies in the Boraginaceae, IX.* By IVAN M. JOHNSTON. 102 pp. Dec. 15, 1932. Price \$2.00; No. 4. *Ligneous Plants Collected in North Queensland for the Arnold Arboretum* by S. F. KAJEWSKI in 1929. By C. T. WHITE. 113 pp. 9 pl. April 1, 1933. Price \$2.75; No. 5. *Flora of Barro Colorado Island, Panama.* By PAUL C. STANDLEY. 178 pp. 21 pl. and map. Oct. 1, 1933. Price \$3.50; No. 6. *Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada. With a Catalogue of the Vascular Plants.* By HUGH M. RAUP. 230 pp. 9 pl. and map. Feb. 15, 1934. Price \$2.50; No. 7. *The Beech Bark Disease; a Nectria Disease of Fagus following Cryptococcus Fagi (Baer).* By JOHN EHRLICH. 104 pp. 9 pl. Sept. 29, 1934. Price \$2.00; No. 8. *An Enumeration of Plants Collected in Sumatra* by W. N. and C. M. BANGHAM. By E. D. MERRILL. 178 pp. 14 pl. Aug. 25, 1934. Price \$2.50; No. 9. [out of print]; No. 10. *The Cephalosporium Disease of Elms.* By DON BAKER CREAGER. 91 pp. 16 pl. July 1937. Price \$2.00; No. 11. *Taxonomy and Geographical Distribution of the Genus Uredinopsis.* By JOSEPH HORACE FAULL. 120 pp. 6 pl. Sept. 30, 1938. Price \$2.00.

THE BRADLEY BIBLIOGRAPHY. A guide to the literature of woody plants, including books and articles in the proceedings of learned societies and in scientific and popular journals, published in all languages, to the end of the nineteenth century. Compiled under the direction of Charles Sprague Sargent by ALFRED REHDER. 4°. 5 vols. Cambridge, 1911-1918. Bound Price \$40.00 Unbound Price \$30.00

THE GENUS PINUS. By GEORGE RUSSELL SHAW. f°. 96 pp. 39 pl. Cambridge, 1914. Price \$10.00

CATALOGUE OF THE LIBRARY OF THE ARNOLD ARBORETUM. Compiled under the direction of Charles Sprague Sargent by ETHELYN MARIA TUCKER. f°. 3 vols. Cambridge, 1914-1933.

Vol. I. Authors and titles. 1914.	Unbound Price \$4.00
Vol. II. Subject catalogue. 1917.	Unbound Price \$4.00
Vol. III. Authors and Titles. Supplement 1933.	Bound Price \$5.50
	Unbound Price \$4.25

THE CONIFERS AND TAXADS OF JAPAN. By ERNEST HENRY WILSON. 4°. 91 pp. 59 pl. Cambridge, 1916. Price \$4.00

THE FOREST TREES OF NEW ENGLAND. By ROBERT GREENLEAF LEAVITT. viii + 179 pp. 1 pl., 2 maps, 78 + 1 figs. sm. 8°. Jamaica Plain, Mass., 1932. Price \$2.00

A BIBLIOGRAPHY OF EASTERN ASIATIC BOTANY. By ELMER D. MERRILL and EGBERT H. WALKER. 719 pp. 4°. Baltimore, Md., 1938. Price \$12.50

YUCCAS OF THE SOUTHWESTERN UNITED STATES. Pt. 1. By SUSAN DELANO MCKELVEY. 150 pp. 8 maps, 80 plates, 4°. Jamaica Plain, Mass., 1938.
Price \$5.00

THE SILVA OF NORTH AMERICA; a description of the trees which grow naturally in North America exclusive of Mexico. By CHARLES SPRAGUE SARGENT. With 740 plates drawn from nature by Charles Edward Faxon. 14 vols. f°. Boston and New York. 1891-1902.

Broken sets. Number of volumes and prices on request.

—Complete sets of the 740 plates drawn from the "Silva." Price \$100.00
—Selected plates (according to number). Price each \$0.50 to \$1.00

GARDEN AND FOREST; a journal of horticulture, landscape art and forestry. Conducted by CHARLES SPRAGUE SARGENT. 10 vols. 4°. Illustr. New York, 1888-1897.—Vols. III-X complete, partly bound; vols. I and II incomplete; also odd numbers (prices on request); bound vols. Price \$6.00; unbound Price \$5.00.

MANUAL OF CULTIVATED TREES AND SHRUBS HARDY IN NORTH AMERICA EXCLUSIVE OF SUBTROPICAL AND WARMER TEMPERATE REGIONS. By ALFRED REHDER. Second ed. revised and enlarged. xxx + 996 pp. map. 8°. New York, 1940. Price \$10.50

AUTIKON BOTANIKON. By C. S. RAFINESQUE. 200 pp. Philadelphia, Pa., 1840, facsimile lithoprint reproduction, 1942. Price \$3.00

A MONOGRAPH OF AZALEAS. By ERNEST HENRY WILSON and ALFRED REHDER. 219 pp. Cambridge, Mass., 1921, reissue, 1942. Price \$4.00

FLORA OF FUKIEN AND FLORISTIC NOTES ON SOUTHEASTERN CHINA. Fasc. 1. By FRANKLIN P. METCALF. xviii + 82 pp. 2 maps. 1942. Price \$1.50

TROPICAL FRUITS FOR SOUTHERN FLORIDA AND CUBA AND THEIR USES. By DAVID STURROCK. 132 pp. 8°. Jamaica Plain, Mass., 1940. Price \$1.25

THE PREPARATION OF BOTANICAL SPECIMENS FOR THE HERBARIUM. By I. M. JOHNSTON. 33 pp. Jamaica Plain, Mass., 1939. Price \$0.30

THROUGH THE ARNOLD ARBORETUM. 8°. 48 pp. 14 pl. 2 maps. Concord, N. H., 1934. Price \$0.25

POST CARDS; views of the Arnold Arboretum. Price \$0.05 for two cards

COLLECTIONS OF PHOTOGRAPHS TAKEN BY E. H. WILSON FOR THE ARNOLD ARBORETUM

THESE pictures represent trees and shrubs and different types of vegetation taken 1907-1922 in eastern Asia, Africa, India and in Australasia. Size of each photograph $8\frac{1}{2} \times 6\frac{1}{2}$ inches. The following series, each accompanied by a typewritten index, are offered at \$0.50 each photograph, if a whole series is taken:

CHINA, series 1 of 500, series 2 of 350 photographs. — JAPAN PROPER, 650 photographs. — LIUKIU ISLANDS, 60 photographs. — BONIN ISLANDS, 30 photographs. — KOREA, 310 photographs. — FORMOSA, 250 photographs. — AUSTRALASIA, 245 photographs. — INDO-MALAYA, 93 photographs. — AFRICA, 184 photographs.

Selections from these photographs will be furnished at an advanced price.

The two following publications prepared at the Arnold Arboretum can be obtained from *Houghton Mifflin Company*, Boston and New York.

TREES AND SHRUBS. Illustrations of new or little known ligneous plants. Prepared chiefly from material at the Arnold Arboretum and edited by CHARLES SPRAGUE SARGENT. With 200 plates drawn by Charles Edward Faxon. 2 vols. f°. Boston, 1905-1913. Price \$40.00

A MANUAL OF THE TREES OF NORTH AMERICA EXCLUSIVE OF MEXICO. By CHARLES SPRAGUE SARGENT. With 783 illustrations from drawings by Charles Edward Faxon and Mary W. Gill. Second edition reprinted with corrections. 910 pp. 8°. Boston and New York, 1926. Price \$5.00

Make checks payable to the ARNOLD ARBORETUM.

